ELECTRICAL WEST

THE ALL-INDUSTRY MAGAZINE OF PROGRESS

McGraw-Hill Co. of California

AUGUST, 1942

25c a Copy

Edison advertising does it again! Once more, the advertising that has helped make Southern California one of the most highly electrified and "electrically-minded" areas in the nation . . . the advertising that has consistently served the best interests of the entire electrical industry . . . has won important honors. For outstanding advertising in the residential, commercial and industrial fields, four first-place awards have been given the Edison Company in the nation-wide 1942 Public Utilities' Advertising Association Better Copy Contest. And Edison advertising, now keyed to wartime conditions, **continues** to render "distinguished service" to Southern California.

SOUTHERN CALIFORNIA EDISON COMPANY LTD.

SOUTHERN CALIFORNIA Edison

ELECTRICAL WEST (with which is consolidated The Journal of Electricity), August, 1942. Vol. 89, No. 2. Published monthly by the McGraw-Hill Company of California, 68 Post Street, San Francisco, Calif. Entered as second class matter at the post office at San Francisco under the Act of March 3, 1879. Additional entry as second class matter at the post office at Los Angeles. Printed in U. S. A. Subscription rate in U. S. and U. S. possessions, and Canada, $2 per year; all other countries $3 gold (thirteen shillings). Single copy 25c.
Copyright, 1942. McGraw-Hill Company of California.

HOW TO CONSERVE COPPER

IN CABLE SYSTEMS FOR WAR-JOB PLANTS

Use HIGHER VOLTAGE

WHEN you are planning expansion of an electric distribution system, or revamping plant wiring, there is an opportunity to save copper (compared with previous practice) by using as high voltage as you can. For example, cable at 480 volts requires only 26 per cent of the copper required for distribution at 208 volts.

Other effective conservation measures, when planning plant distribution for war production, are (1) use a high-temperature insulation because temperature limits of the insulation govern the permissible copper size; (2) use three-conductor instead of single-conductor cable wherever voltage regulation is the deciding factor, because the reactance drop in a three-conductor cable is less.

HOW MUCH COPPER CAN YOU SAVE?—Ask Us

In practically every case there can be a choice between two or more cables to do a job well. One, however, may permit a saving in copper—and will also conserve other vital materials.

Let us help you determine the cables that will do the job successfully and that will also conserve copper. General Electric cable engineers, both in your section of the country and at the factory, offer their services in figuring for you, or with you, just what the opportunities are.

When you save copper in the cable, you conserve copper in that part of the plant electrical distribution system where the copper requirements are the heaviest. For additional information, just ask the nearest G-E office, or write to General Electric, Schenectady, N. Y.

The Navy "E", for Excellence, has been awarded to 92,780 General Electric employees in five plants manufacturing naval equipment.

NOT THIS

500,000 cir mils—conductor size for *208 volts*

4.6 LB COPPER PER FOOT

BUT THIS

2/0 Awg—conductor size for *480 volts*

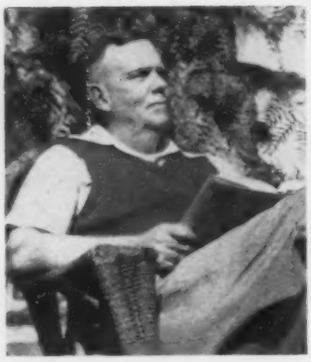
ONLY 1.2 LB PER FOOT

GENERAL ELECTRIC

501-15-1200

Here in the WEST

People



Alfred M. Cooper

is no armchair theorist in public relations work, of which he writes on p. 39. Although author of three books, *How to Supervise People*, *Employee Training* and *How to Conduct Conferences*, all published by McGraw-Hill Book Co., he earned his right to speak from a career of practical experience. He was a supervisor for Puget Sound Power & Light from 1912-20; instructor, Kansas City public schools 1920-23; engineer, Western Electric Co., 1923-26; supervisor of conference training for five Insull utilities, 1926-27; consultant in industrial training for many large concerns 1927-32; lecturer, University of Southern California, 1932-34; educational director Los Angeles Dept. of Water & Power 1934-38.

Donald G. Worth

electrical engineer on the Bonneville administration's substation design staff, is a graduate of the University of Southern California, and a former engineering student of Syracuse University, N. Y. He also has done graduate work at the University of Colorado in electrical engineering. Prior to assuming his present position with the Bonneville administration he held design positions with Southern California Edison Co.; the Union Oil Co., where he specialized in the electrical design of oil refineries; the Sterling Electric Motors Co.; Dwight P. Robinson & Co.; and the U. S. Bureau of Reclamation.

Pages

Public Relations of Private Enterprise 39
By ALFRED M. COOPER—A discussion of employee-consumer relationship and the part good personal service can play in determining the final vote on the ownership question.

J. D. Ross Substation is Northwest's Largest 41
By DONALD G. WORTH—Work has never stopped on this station, which at present is supplying up to 266,000 kw. to industry.

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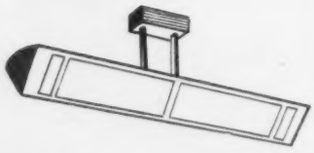
Cover photo: Steam from white coal at Grand Coulee Dam.

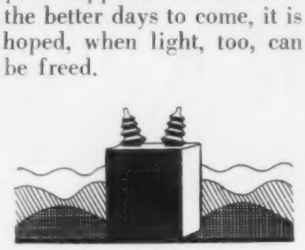
Preview



Lighting Season

starts in September, but of course, in a war year things are different. No longer are the materials available for civilian use out of which to fashion improved lighting. Some of the finest lighting installations in all time so far are serving the war production plants of the country, but pictures and design details of these are often restricted.

In its September issue, ELECTRICAL WEST will present as much as is available of wartime lighting practice as a guide to the design of that which is still to be done, and in addition, provide a series of lighting ideas representing the last word in civilian lighting installations in the West, not in a nostalgic mood, but to serve as guide material, both in war plant applications and for the better days to come, it is hoped, when light, too, can be freed.



Capacity Increase

not by adding generating equipment but by salvage of wasted watts, lost in system power factor, will be the subject of an article scheduled for September. Experience of Northwestern Electric Co. in salvaging 8,500 kw. for additional use will be recounted in the engineering pages of that number. Los Angeles Bureau of Power & Light's "tower an hour" crane erection technique also will be discussed in September.

An Ex-Bell Pusher

will recall for those who have little merchandise now to sell, some of the human and humorous incidents of that fascinating and resourceful vocation (now retired for the duration seemingly) salesmanship. The *Business Guide* for September, originally planned to deal with methods of selling IES lamps, will sketch the way in which light can aid war production, add the equivalent of man-hours at a needed time.

HOW TO SAVE COPPER AND MAN-HOURS

WITH ALLIS-CHALMERS 5/8% STEP REGULATORS!

One Midwestern System Conserves Copper and Man-Hours . . . Maintains Uniformly High Voltage . . . By Installing an Allis-Chalmers 5/8% Step Regulator!

To maintain maximum production in the nation's industrial plants, utilities must not only meet the growing demand for power — they must supply this power at uniformly high voltages.

But when line loads grow heavier, voltage tends to drop . . . as it did on this midwestern system . . .

At the end of a 20 mile feeder, motors were operating at only 88% of rated voltage. To correct this condition and allow for anticipated load growth required replacing the three No. 4 solid conductors with No. 2 copper wire.

Or there was needed $\frac{5280 \times 20 \times 3 \times 200.5}{1000}$ = 63,360 lb of copper.

Crediting the salvage of the No. 4 wire (39,920 lb), the additional copper needed was 23,440 lb. Also, thousands of man-hours were required to remove the old conductors and install the new.

But, before going ahead, this system called in an Allis-Chalmers engineer. He showed them how they could correct the voltage condition by installing a 104 kva, three-phase, 12,000 volt, Allis-Chalmers 5/8% Step Regulator.

The regulator required but a few hundred pounds of copper, a fraction of the man hours to build and install. What's more, it corrected for reactance as well as resistance drop . . . compensated for fluctuating source voltage.

Before you buy a regulator, remember only Allis-Chalmers 5/8% Step Regulators give you all the five advanced engineering features listed on this page!

For all the facts on how Allis-Chalmers 5/8% Step Regulators give you *on-the-line* performance, call the district office near you. Or write to Allis-Chalmers, Milwaukee, Wisconsin . . . *today!*

A 1505

SYSTEMS ALL OVER THE COUNTRY find Allis-Chalmers 5/8% Step Regulators, like this one, invaluable in maintaining uniformly high voltage under constantly growing loads.

REASONS WHY ENGINEERS CHOOSE ALLIS-CHALMERS 5/8% STEP REGULATORS!

1 **Closer Regulation!** 5/8% half-cycling steps plus "Feather-Touch Control" permit band width settings within ±5/8 of 1%.

2 **Longer Contact Life!** Not a single contact has ever been replaced on an Allis-Chalmers Regulator due to deterioration under normal operation.

3 **Lower Exciting Current!** Need only 1/3 the exciting kva required by older types of regulators.

4 **Increased Dielectric Strength!** Unit construction eliminates 78 bolted connections between compartments.

5 **Minimum Maintenance!** No holding or braking devices. Complete oil-immersion of all moving parts means there's nothing to lubricate.

When On-the-Line Performance Counts... Count On

ALLIS-CHALMERS

MILWAUKEE · WISCONSIN

...keep *Electrically Fit!*

for 168 hours of war-work a week!

Keeping plants *electrically fit* for continuous war production calls for all the know-how you can rally on two important points:

(1) How to get the most out of your present motors, controls and other power apparatus.

(2) How to get new electrical equipment when it's essential to full-scale war output.

Your GRAYBAR Representative is your first-line source of this know-how. And he is backed up, when you need it, by the Graybar Power Apparatus Specialist . . . a man whose full-time job is concentrated on industrial power-application problems. Particularly if your problem is to decide how far to go in the re-use of old equipment . . . how it can best be supplemented by new control units, capacitators, voltage regulators, etc., to increase production while conserving critical materials . . . GRAYBAR is the place to call.

For advice on compliance with priority rules, for a broad knowledge of what's available and when deliveries can be made, check with your GRAYBAR Representative. Or if it's maintenance help you're after, ask him for copies of helpful service bulletins compiled by manufacturers whose products come to you "via GRAYBAR".

"HOW TO CARE FOR MOTORS"

Whether your motors are old or new, you can help to steer clear of interruptions and delay by following the maintenance plan developed by General Electric and fully outlined in this new bulletin. Write GRAYBAR today for GEA 2856.

A "COMBINATION" THAT ADDS TO PROTECTION

You save installation time, conserve on wiring and give your motors unfailing protection when you specify the new G-E Combination Motor Starters. One self-contained unit combines magnetic starter and safety switch. Write for GEA 3715.

Executive Offices: GRAYBAR BUILDING New York, N. Y.

GraybaR

IN OVER 80 PRINCIPAL CITIES

Everything Electrical THAT IT TAKES TO WIN!

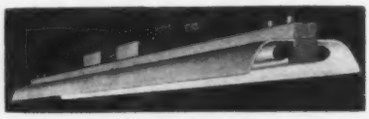
PRODUCTS

that are news

Non-metallic F Reflector (800)

A new fluorescent industrial unit with non-metallic reflector has been designed by Curtis Lighting, Inc. for war production industries. These units employ CurtiStrip wiring channel and are for two or three 40-watt lamps or two 100-watt lamps per reflector. Eight or ten-foot sections may be joined for continuous runs of any length, or reflectors may be omitted when desirable without interfering with the continuous wireway, the manufacturer states.

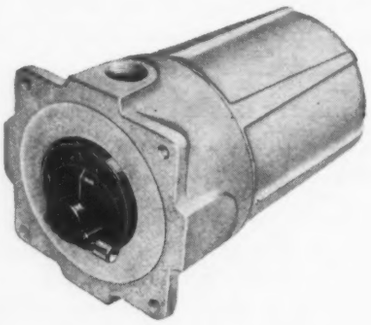
Ballasts and starters are mounted on top of the CurtiStrip to make them readily accessible at any point. The CurtiStrip cover snaps into the top of the channel.



The reflector is Fluracite, a white synthetic finish. The manufacturer claims this finish does not discolor and provides a smooth surface of unusually high reflectivity for the hard, non-metallic material of which the reflector is fabricated.

Explosive-proof Timers (801)

The R. W. Cramer Co. has announced a line of explosive-proof timers for operation in atmospheres containing gasoline, naptha, petroleum, benzol, acetone, lacquer solvent, natural gas and so forth. Illustrated is a type TDIC Explosion-Proof Time Delay Relay, laid



out for panel board mounting with the setting knob and dial projecting. According to the manufacturer, a TDI with small relay would be used where it is desired to control the timer from a remote momentary start button.

Universal Heating Pad (802)

Universal has announced a new use for its heating pad—as a relief to women unaccustomed to factory work. The pad is made with special tie-on tapes and can be fastened securely on the back or other part of the body and still give freedom of movement, the manufacturer states.

HOME LAUNDRY TRAINING WEEK!

SECOND OF NATIONAL SERIES

General Electric appliance training schools have already won the enthusiastic support of dealers and service men from coast to coast. More than 3000 recently took refrigerator service training in approximately 100 schools across the country. Now comes the second national series of schools, concentrating on G-E Home Laundry equipment, including washers and ironers.

BEGINNING AUGUST 24th

Some time from the latter part of August on there will be a G-E Home Laundry Service Training School in session near you. A partial list of dates and locations are shown in the box.

SOME OF THE FEATURES

1. Sensational new G-E Movie: "Into the Wringer and Out—with J. Smedley Sprout." 2. Sound slide film: "Servicing Washer Mechanisms and Wringers." 3. Another movie (tentative): "Eight Months Later," brings you up to date on G.E.'s service policy and program. 4. "Round Robin," session on washer and ironer servicing, supervised by G-E trained service personnel.

SEE YOUR G-E DISTRIBUTOR

Home Laundry Training Schools in your locality are sponsored by your General Electric appliance distributor. Be sure to get in touch with him *now* for actual dates and other information. All dealers and service men interested in G-E washer and ironer servicing are cordially invited to attend. Some time will also be devoted to service problems on other appliances.

★ ★ ★

GENERAL ELECTRIC and its distributors have a three-fold aim in setting up these national service training schools . . . 1. To help back up the Government's Conservation Program. 2. To help Mrs. America get the most out of her appliances for the duration. 3. To assist G-E appliance dealers in performing a better servicing job and thus help them build a more successful business.

Already more than 1000 dealers have qualified through our distributors as authorized Appliance Service Center dealers for G-E appliances. Get all the facts on how you, too, can qualify, by attending one of the Home Laundry Training Schools your G-E distributor is going to conduct. Consult him TODAY!

ENROLL NOW IN ONE OF THESE HOME LAUNDRY TRAINING MEETINGS!

NORTHEASTERN DIST.

Utica, New York	Aug. 17
Albany, New York	Aug. 18
New Bedford, Mass.	Aug. 20
Providence, R. I.	Aug. 21
Boston, Mass.	Aug. 25
Hartford, Conn.	Aug. 26
Worcester, Mass.	Aug. 27

METROPOLITAN DIST.

N. Y. City (2 schools)	Aug. 25
New York City	Sept. 15
Newark, N. J.	Aug. 27

ATLANTIC DISTRICT

Williamsport, Pa.	September
Clearfield, Pa.	September
Reading, Pa.	Sept. 14
Wilkes-Barre, Pa.	Sept. 16
Allentown, Pa.	Sept. 18
Lancaster, Pa.	Aug. 25
Harrisburg, Pa.	Aug. 26
Philadelphia, Pa.	Sept. 15
Atlantic City, N. J.	Sept. 22
Wilmington, Del.	Aug. 25
Baltimore, Md.	Aug. 26
Washington, D. C.	Aug. 27
Luray, Va.	September
Hagerstown, Md.	September

SOUTHEASTERN DIST.

New Orleans, La.	Aug. 25
Jackson, Miss.	Aug. 26

EAST CENTRAL DIST.

Middleboro, Ky.	Aug. 24
Grand Rapids, Mich.	Aug. 25
Lexington, Ky.	Aug. 25
New Castle, Pa.	Aug. 25
Louisville, Ky.	Aug. 26
Pittsburgh, Pa.	Aug. 26
Columbus, Ohio	Aug. 27
Saginaw, Mich.	Aug. 27
Evansville, Ind.	Aug. 27
Canton, Ohio	Aug. 27
Cincinnati, Ohio	Aug. 28
Toledo, Ohio	Sept. 2
Fort Wayne, Ind.	Sept. 3
Cleveland, Ohio	not set

CENTRAL DISTRICT

Indianapolis, Ind.	Aug. 24
Muncie, Ind.	Aug. 25
Terre Haute, Ind.	Aug. 26
Chicago, Ill.	Aug. 27
Rockford, Ill.	Aug. 28
Peoria, Ill.	Aug. 31
South Bend, Ind.	Aug. 31
Urbana, Ill.	Sept. 1
Milwaukee, Wis.	Sept. 2
St. Louis, Mo.	Sept. 4

WEST CENTRAL DIST.

St. Paul, Minn.	Aug. 19
Minneapolis, Minn.	Aug. 20
La Crosse, Wisc.	Aug. 24
Mankato, Minn.	Aug. 25
Denver, Colo.	Aug. 27
Duluth, Minn.	Aug. 27
Brainerd, Minn.	Aug. 28
Burlington, Ia.	Aug. 31
Davenport, Ia.	Sept. 1
Dubuque, Ia.	Sept. 2
Waterloo, Ia.	Sept. 3
Mason City, Ia.	Sept. 4
Fargo, N. D.	Sept. 10
Sioux Falls, S. D.	Sept. 14
Sioux City, Ia.	Sept. 15
Omaha, Neb.	Sept. 17
Des Moines, Ia.	Sept. 18
Kansas City, Mo.	Sept. 21
Joplin, Mo.	Sept. 23
Wichita, Kansas	Sept. 25

SOUTHWESTERN DIST.

Oklahoma City, Okla.	Aug. 23
Wichita Falls, Texas	Aug. 24
Dallas, Texas	Aug. 25
Little Rock, Ark.	Aug. 26
Tyler, Texas	Aug. 26
Waco, Texas	Aug. 27
San Antonio, Texas	Aug. 28
Houston, Texas	Aug. 28
Beaumont, Texas	Aug. 29
Tulsa, Ariz.	Aug. 30

PACIFIC COAST DIST.

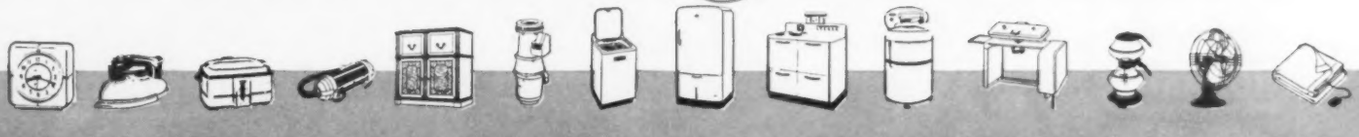
Bakersfield, Calif.	Aug. 24
Los Angeles, Calif.	Aug. 24
San Jose, Calif.	Aug. 24
Eugene, Ore.	Aug. 24
San Diego, Calif.	Aug. 25
San Francisco, Calif.	Aug. 25
Fresno, Calif.	Aug. 25
San Bernardino, Calif.	Aug. 26
Bellingham, Wash.	Aug. 26
Stockton, Calif.	Aug. 26
Portland, Ore.	Aug. 26
Seattle, Wash.	Aug. 27
Sacramento, Calif.	Aug. 27
Phoenix, Ariz.	Aug. 28
Olympia, Wash.	Aug. 28
Red Bluff, Calif.	Aug. 28

AUTHORIZED GENERAL ELECTRIC APPLIANCE SERVICE CENTER DEALER

This sign, identifying the G-E Authorized Service Center Dealer, will get wide-spread publicity. A full-color, 2-page advertisement featuring it will appear in the August 29th issue of the Saturday Evening Post, *which is on the newsstand August 25th. Other equally striking advertisements will appear in* Life, *August 24th;* Better Homes and Gardens, *September;* Ladies' Home Journal, *September; and* McCall's, *September.*

General Electric Co., Appliance and Merchandise Department, Bridgeport, Connecticut

GENERAL ELECTRIC



FOR *BOTH* OUR COUNTRY AND YOU

★

★ ★

Today and for the days to come, we're throwing everything we have into the battle of production. We're producing vital materials for the needs of our country--and we're also supplying the essential needs of our customers, to the best of our productive ability. ¶ So far, the bases have been loaded against us--but now it's our turn to load the allied bases and keep them loaded by batting-out supplies and equipment for the men in our fighting forces. Toward this end we've pitched-in and will keep up the pitch till we win.

HUBBARD PRODUCTS

Standard Pole Line Hardware
★
Communication System Hardware
★
Electric Railway Hardware
★
Insulator Pins
★
Pole Top Fixtures and Steel Cross Arms
★
Strain Insulators and Clevises
★
High Tension Material
★
Secondary Racks and Accessories
★
Pole and Cross Arm Brackets
★
Street Lighting Equipment
★
Rural Electrification Material

HUBBARD

Hubbard and COMPANY

OAKLAND, CAL. PITTSBURGH CHICAGO

HANG THE LOAD ON HUBBARD HARDWARE

HUBBARD

SMOOT-HOLMAN

SMOOT-HOLMAN COMPANY
SIGHT-CRAFT
INGLEWOOD CALIFORNIA

LUMINAIRES FLUORESCENTS
REFLECTORS FLOODLIGHTS

INDUSTRIAL AND COMMERCIAL LIGHTING EQUIPMENT

HOME OFFICE AND FACTORY
INGLEWOOD, CALIFORNIA

WAREHOUSES

SAN FRANCISCO
460 7th Street

HOUSTON, TEXAS
315 Crawford St.

REPRESENTATIVES

FRED ZAUGG
907 N.W. Irving St.
Portland, Ore.

COAST SALES CO.
307 Main Street
Seattle, Wash.

STEVENS SALES CO.
41 Post Office Place
Salt Lake City, Utah

G. S. SPANGLER
618 Colorado Bldg.
Denver, Colo.

AVAILABLE NOW

Conserve Critical Materials!

Use "Wire-Nuts"—They save the critical war materials—Lead, Tin and Rubber as used in solder-and-tape joints.

Wire-Nuts

Solderless, Tapeless Wire Connectors

Millions in Use—Better electrically; stronger mechanically. Pass inspection quickly.
FULLY APPROVED. Listed by Underwriters' Laboratories, Inc. SIZES FOR EVERY JOB.

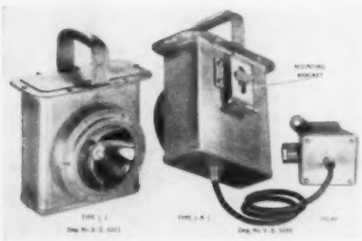
Write for FREE Samples

Other War-Time Wiring-Job Speeders

IDEAL SOLD THROUGH JOBBERS

IDEAL COMMUTATOR DRESSER COMPANY
WEST COAST WAREHOUSE STOCKS:
Strieby & Barton Ltd., 312½ E. 3rd St., Los Angeles, Cal.
F. M. Nicholas Co., 1123 Harrison St., San Francisco, Cal.
L. S. Foley, 1233 N. W. 12th Avenue, Portland, Oregon
Robinson Sales Co., 3215 Western Avenue, Seattle, Wash.

Naval Hand Lantern (803)



A new emergency lantern has been announced by S. & G. Mfg. Co. This lantern is made of stamped steel and has a shock-proof mounting bracket. Type J-R-1 is connected to a gravity type relay, which automatically places it in circuit upon the failure of the normal current supply, the manufacturer states.

F Extension Cord (804)

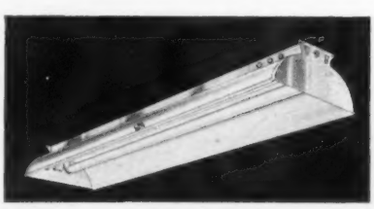
Hygrade Sylvania is manufacturing a fluorescent extension cord light for use in war plants. This unit, according to the manufacturer, was designed at the request of a bomber parts manufacturer and is a small, cool light for close work and inspection in restricted areas.

The fixture is claimed to be so cool that it may be clipped to the worker's belt or hooked into the lapel of his coat, leaving both hands free. The lamps can be replaced in a few seconds time, according to the manufacturer, who claims that the total power consumption is 8 watts, including lamp and auxiliary. Low brightness of the fluorescent light source with absence of glare is another feature listed.

Operates at 110-125 volts, 60 cycle AC; overall length, 9½ in.; width, 1 in.; height, 1¾ in.; average weight, 2½ lbs.; finish gray Miracoat baked enamel on chassis and end caps, white Miracoat baked enamel on reflector and grille. Furnished complete with ballast operating equipment and 12 ft. of cord. List price $9.50. Orders acceptable with A-1 group priority only.

Guth Luminaires (805)

A new line of porcelain enamel industrial fluorescent luminaires has been developed by the Edwin F. Guth Co. These units, the XLO Flu-O-Flector, closed-end type and the Victory XLO, open-end fixture, according to the manufacturer, have been designed to use a minimum of steel. They have Guth Super-White Porcelain Enamel Reflectors, with "V" design to eliminate pocketing of light and three coats of porcelain enamel fired on at



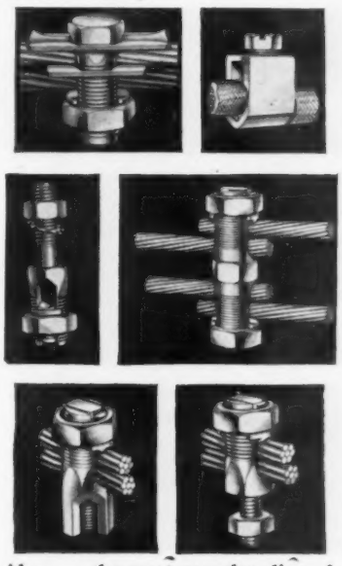
1,600°. Both types feature the new Guth "Bump-Proof Socket Plates" to protect lampholders from breakage in transit, installation or cleaning, the manufacturer states. Starters are set in the side of the channel, where they are accessible at all times. Available for two or three 40-watt lamps and two 100-watt lamps. May be mounted individually or in continuous runs with flush-ceiling or suspended mountings.

"All SIZES of SERVICE CONNECTORS—

from No. 10 to 1,000,000

and All TYPES"

You can find exactly the service connector you need, in the Penn-Union Catalog: Yoke-and-Nut type, in a complete range of sizes . . . Service Entrance connectors . . . Service Post and Special connectors in wide variety.



Also . . . the most complete line of Tee Connectors, Cable Taps . . . Straight, Parallel, Elbow and Cross Connectors . . . Bus Supports, Clamps, Spacers . . . Grounding Clamps, Terminal Lugs . . . practically every good type.

NORTHWESTERN AGENCIES
2411 First Ave., Seattle, Washington

F. M. NICHOLAS CO.
1123 Harrison St., San Francisco

KENNETH ANDERSON CO.
334 East 4th St., Los Angeles

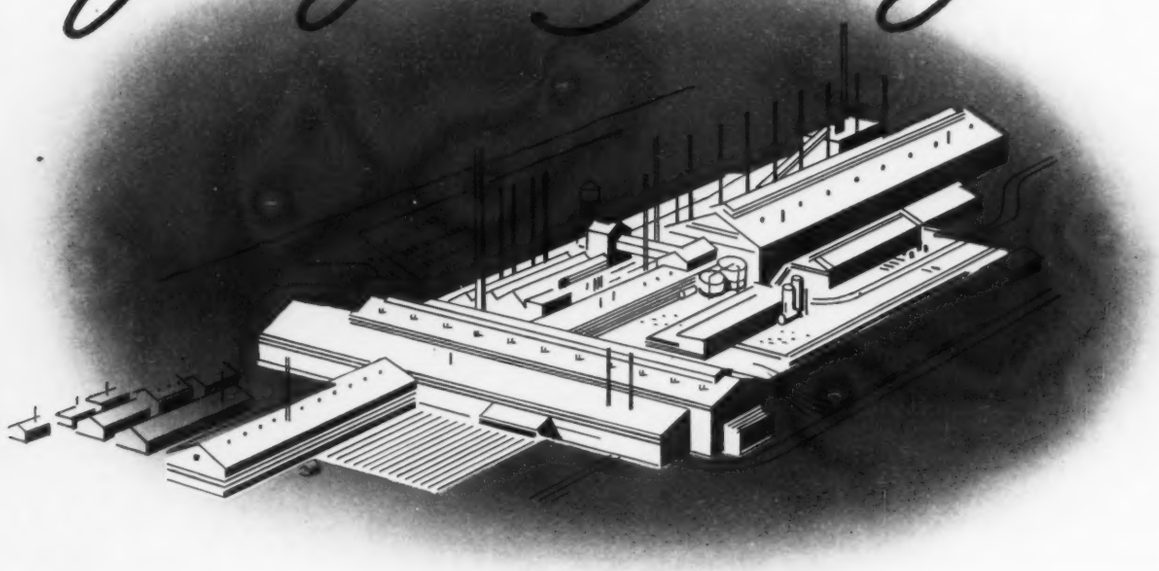
Penn-Union Electric Corp., Erie, Pa.

PENN-UNION
Conductor Fittings

WESTINGHOUSE

Westinghouse

"fits" your Factory



CHOOSE THE POWER DISTRIBUTION SYSTEM THAT MEETS ALL OF YOUR REQUIREMENTS

It's easy to select the right plant distribution system. There are many different types available from which to make your selection. The important job is to choose the system that meets your plant's individual requirements. Only then can you be sure of maximum results, both from the standpoint of economy and efficiency.

Investigate carefully before you install. Regardless of the size, shape or type of factory you'll find an established distribution system that will service your load requirements.

Westinghouse can supply equipment for all of the different systems, including the new Plant Network System which has been adopted by nearly 40 new, large war factories.

All systems recommended by Westinghouse are designed for use with standard distribution equipment. No matter which system you select there will be no need to build special apparatus.

To help you select the system that fits your plant, Westinghouse has prepared a special book in which the advantages and applications of a group of different systems are briefly described. Just fill in and mail the coupon for your copy.

If you want faster action, phone our nearest office and ask one of our engineers to call and discuss your distribution problem. You will get immediate co-operation.

Westinghouse Electric & Manufacturing Company
East Pittsburgh, Pa.

FREE QUICK FACTS ABOUT PLANT DISTRIBUTION SYSTEMS

Westinghouse Electric & Mfg. Co.,
East Pittsburgh, Pa.
Please send book B-3152 giving quick facts on Westinghouse Distribution Systems.

Name _____ Title _____

Company _____

Address _____

City _____ State _____

J-94313

PLANT DISTRIBUTION SYSTEMS

"FLURATEX" REFLECTOR UNITS

Curtis lines up with the nation's conservation program by offering its Non-Metallic Reflector Industrial Units with a minimum amount of steel.

Cat. No. 1506 is designed for two 40 watt fluorescent lamps with provisions for the installation of a third lamp at any time. Cat. No. 1507 for three 40 watt lamps. Cat. No. 1508 for two 100 watt lamps.

The "Fluratex" reflectors on these units are guaranteed to give first-class performance. They are rigid in construction, chip-proof and designed to utilize all the light from the lamp.

"Fluratex" reflectors are finished in Fluracite, a baked synthetic reflecting surface, glossy white and mineral hard, discovered by Curtis after extensive research, especially developed to maintain and not distort the color value of the fluorescent lamp. Fluracite possesses unusually high reflectivity and is easily cleaned with soap and water. Fluracite has been successfully used for over 3½ years on most Curtis Fluorescent products.

Write today for further information.

Western Representative
JOHN D. ERIKSON
153 Kearney Street
San Francisco, Calif.
W. K. TURNER
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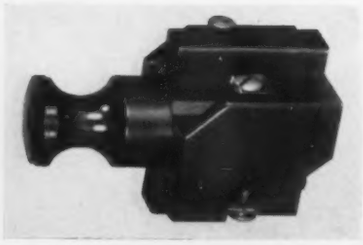
Seattle, Washington

CURTIS LIGHTING, INC.
6135 W. 65th Street . . Chicago

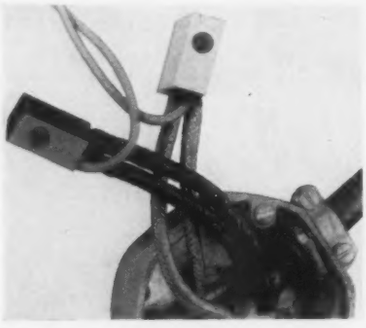
Control Unit (806)



A new line of interchangeable Safety Pull-Push Button Stations has been announced by the Arrow-Hart & Hegeman Electric Co. Features claimed for these control units by the manufacturer are greatly increased safety and economy and convenience of a single button for stopping and starting.

Plastic Connector (807)

A new fixture connector, made entirely of plastic, has been placed on the market by the H. B. Sherman Mfg. Co. Of the set screw type, it is claimed by the manufacturer to be the only non-metallic fixture connector using a positive set screw for securely holding the wires in contact. It is made in two colors —red for the hot wire and white for the ground, providing an easy means of identifying connections.



The plastic material itself is extremely tough and durable, according to the manufacturer. The set screw may be tightened up with plenty of tension to make a permanent job that won't jar or shake loose, it is stated.

The body of the connector has been made slightly larger and the "V"-shaped opening for the wires has been increased in size for faster, easier assembly, according to the announcement.

Philco Timer (808)

Philco Corp. is manufacturing an electrical timing device, arranged to close an electrical circuit after the expiration of a pre-determined time. By reversing the position of the mercury switch element, it can be adapted for opening a circuit, according to the announcement. When used on AC circuits, it has a capacity of 1,200 watts, sufficient to control a 1 h.p. motor of the repulsion induction type, the manufacturer states.

The switch is set for operation by turning a knob to the time, up to 23 hours in advance. A series connector with 5 ft. of heavy-duty cord is supplied to simplify connections to plug-in types of equipment, according to the manufacturer. When the connector has been plugged into the electrical outlet and the apparatus to be controlled into the connector, the installation is completed by fastening the timer to the wall above the electrical outlet.

Pull-Out-Proof
ANCHORS
Lead Expansion Type

- Save time, labor and "callbacks"
- Simply place in hole, tap with setting tool and tighten
- Precision threaded, rust and vibration resistant
- Assure a permanent workman-like job
- Fig. 900 available in 9 standard diameters from 6-32 to ⅝". Fig. 910 in ¼", ⅜", ½" diams. in standard lengths

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FASTENING and HANGING DEVICES

Mailway Banking
A Real Help to Professional People

No longer must busy doctors, lawyers, engineers, take time just "to go to the bank." Our Mailway service eliminates all that. We provide special envelopes and forms that make banking by mail easy and safe. More and more professional people are opening Mailway accounts because they can do their banking when most convenient, night or day, at home or in the office.

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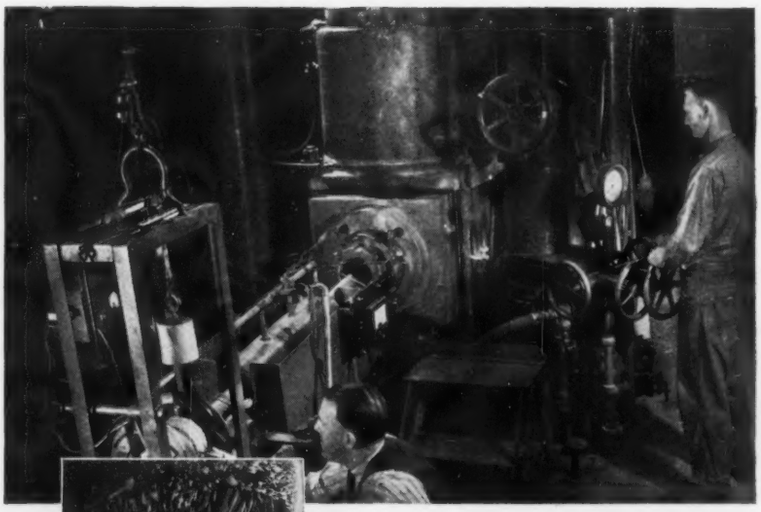
Member Federal Deposit Insurance Corporation
ONE MONTGOMERY STREET

It Took 2 Ideas to...



Blitz the "Bugs" in LEAD SHEATHING

INCOMPLETE UNION

of charges which later leads to cable sheath failure results from the old method of sheathing.

COMPLETE UNION

of charges is obtained by the combination of stabilized lead (freed from oxides and harmful impurities) and the Hill Standpipe method of bottom filling. This filling from the bottom assures uniform knitting of old and new charges – thus eliminates the cause of laminations.

Stabilized lead plus the Hill Standpipe pouring method eliminate laminations and inclusions . . . make lead sheaths for paper insulated cables uniformly strong throughout— another development of

OKONITE-CALLENDER RESEARCH

The most common seeds of self-destruction which a cable sheath may contain are laminations (caused by improper bonding of successive lead press charges) and oxides or other inclusions in the lead itself.

Okonite-Callender Research successfully solved this costly and troublesome problem by developing a treated lead (Stabilized lead) that is freed from harmful inclusions . . . and the Hill Standpipe pouring method that assures complete union of old and new charges. Here's proof the lead sheaths that protect Okonite-Callender Paper Insulated Cables stay tight in service.

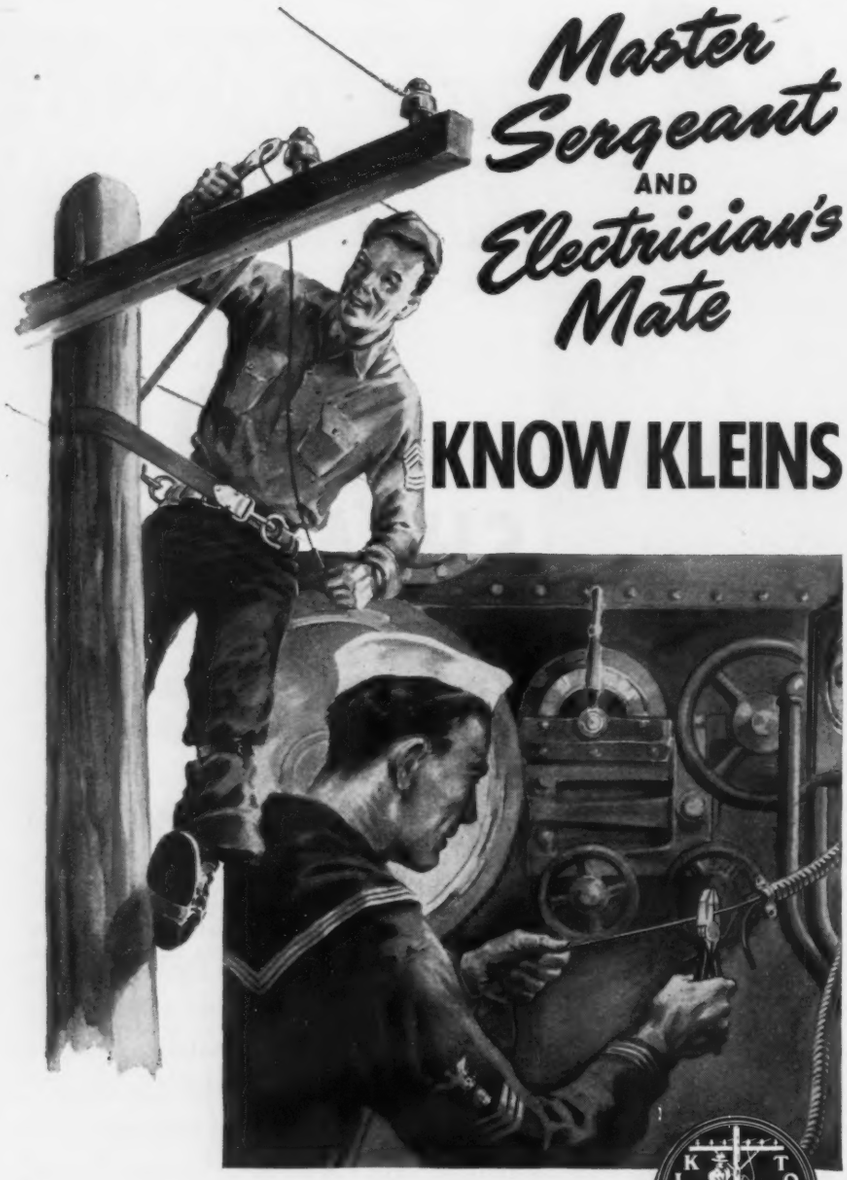
In five years of experience with this Okonite-Callender technique of lead sheathing, not one lead sheath failure from lamination or inclusions has occurred. Once again, Okonite-Callender Research has set the pace for efficiency of paper insulated cables.

CROSS-SECTION OF SHEATH

from Okonite-Callender Cable. 58 samples from one production length, tested by an independent laboratory, showed no defects of any kind – no flow lines, no "critical" region, no lamination in lead structure.

THE OKONITE-CALLENDER CABLE CO., INC.
An Affiliate of The Okonite Co.
Executive Offices: Passaic, N. J.
Offices in principal cities

OKONITE CALLENDER Paper Insulated Cables



Master Sergeant AND Electrician's Mate

KNOW KLEINS

Any man who works with tools knows how much his skill depends on their quality—work is better done—performed with greater speed when the pliers are Klein's.

Today Klein pliers, belts and straps, climbers, grips, splicing clamps, wrenches and knives are helping fight America's battle both with the armed forces and with the army of workers behind the lines, who are keeping power, communications and transportation operating at peak efficiency.

ASK YOUR SUPPLIER

Foreign Distributor:
International Standard Electric Corp., New York

Mathias KLEIN & Sons
Established 1857 Chicago, Ill., U.S.A.
3200 BELMONT AVENUE CHICAGO

"Bomb-Snatcher" (809)

McGraw Electric Co. is manufacturing a "Bomb-Snatcher" for handling incendiary bombs, and claims that the device permits picking them up in split seconds with safety to the operator. It consists of a pair of tongs with semi-cylindrical refractory-lined jaws. Pulling back on the handle lever causes the jaws to enclose the burning bomb and drop it into the lower section where it is held as in a trough to prevent the molten white-hot

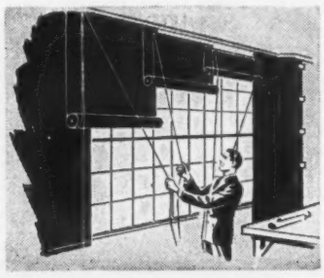
material from spilling, the announcement states. It is said to have an effective snuffing action on magnesium bombs and to have been tested with thermite bombs at a temperature of 4,500°.

Portable Drills (810)

Ka-Mo Tools, Inc. announces portable earth boring drills for boring holes 3 to 16-in. in diameter. The manufacturer claims that these units are easy to operate and to assemble. They are transportable by auto or truck and are operated from an air compressor through air hose connection to air motor, it is stated. It is claimed that they can drill vertically or at any desired angle and in inaccessible places such as under viaducts, on tops of steep banks, behind fences and ditches.

Blackout Blinds (811)

Clopay Co. has announced blackout blinds of heavy crepe fibre which it claims are adaptable for windows of any size or number in factories, hospitals and public buildings. This blind is of the cord type and, according to the manufacturer, is chemically treated to make it incapable of supporting combustion.



Side panels are available for permanent installation at the end of a series of windows, at corners, posts or other obstructions to insure a complete light seal. The same crepe fibre material is available for outside installation on skylights and for blacking out sawtooth buildings. The manufacturer claims installation cost is about the same as paint.

How to get FASTER, EASIER, SAFER Industrial Expansion!

INSTALLED RIGHT AT the machine they serve, Allis-Chalmers Dry Type Transformers, like this 37½ kva unit, eliminate long secondary runs of heavy copper . . . improve voltage conditions.

Allis-Chalmers Dry Type Transformers Can Be Installed Right at Load Centers . . . with No Fire Hazard . . . No Time-Wasting Vault Construction . . . No Long Runs of Secondary Copper!

Now is the time America at war must do everything possible to speed industrial expansion and conversion. And one way more and more plants are doing this . . . and at the same time getting increased production . . . is with Allis-Chalmers Dry Type Transformers.

HERE'S WHY—

1. No Fireproof Vaults! Absence of oil eliminates need for time-wasting construction.

2. Save Valuable Floor Space! Allis-Chalmers Dry Type Transformers can be placed anywhere — on posts, beams, overhead platforms—because there's nothing to leak.

3. Greater Flexibility! Smaller transformers at load centers permit quick changeover to meet shifting production demands.

4. Conserve Vital Copper! Long, heavy secondary runs are done away with . . . savings in copper run as high as 50%!

5. Improved Motor and Lamp Performance! On-the-spot location means you need less voltage regulation. And your line losses are lower.

6. Maintenance Slashed! Your servicemen don't have to waste time testing or filtering insulating liquids.

For complete information on the Allis-Chalmers Dry Type Transformer, call the district office near you. Or write direct to Allis-Chalmers, Milwaukee, Wisconsin.

A-1522

ALLIS-CHALMERS
MILWAUKEE·WISCONSIN

WE WORK FOR VICTORY WE PLAN FOR PEACE

VARNISHED CAMBRIC • RUBBER POWER CABLES • BUILDING WIRE • RADIO WIRES • SIGNAL CABLE • FLEXIBLE CORDS • LEAD-ENCASED AND PARKWAY CABLES • ARMORED CABLE

CRESFLEX NON-METALLIC SHEATHED CABLE • SERVICE ENTRANCE CABLE • MAGNET WIRE • BARE WIRE

CRESCENT PERMACORD

WELDING CABLE

AND PORTABLE CORDS AND CABLES

USE MINIMUM RUBBER

Heavy, hard-twisted cotton outer jacket over adequate rubber insulation gives maximum protection from abrasion, heat, oils, greases and weather to the super-flexible copper conductor. The use of this fabric jacket results in a saving of over 75% of the rubber usually employed in high grade welding cable.

PERMACORD heavy-duty, jacketed PORTABLE CORDS and CABLES are available in all sizes from No. 18 A.W.G. to 1,000,000 C.M. and offer the same advantages as above.

SAFE — DURABLE — ECONOMICAL

CRESCENT INSULATED WIRE & CABLE CO.

CRESCENT
WIRE and CABLE

Factory: TRENTON, N. J.—*Stocks in Principal Cities*

LOS ANGELES
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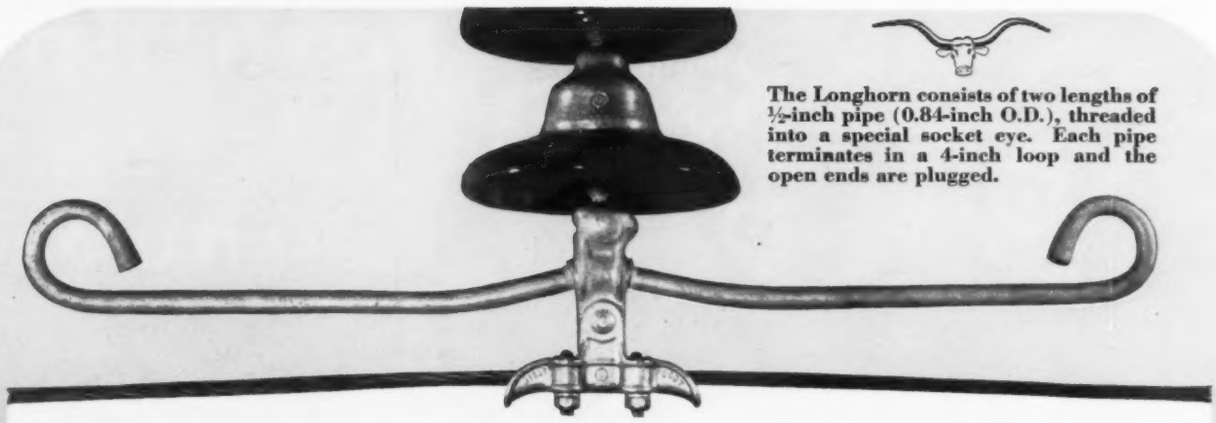
KANSAS CITY
W. F. Howe & Co.,
2627 McGee St.

CRESCENT ENDURITE SUPER-AGING INSULATION • WEATHER-PROOF WIRE



The Longhorn consists of two lengths of ½-inch pipe (0.84-inch O.D.), threaded into a special socket eye. Each pipe terminates in a 4-inch loop and the open ends are plugged.

Meet the LONGHORN *and* BIGHORN

---O-B's NEW Boltless Arcing Horns Which Improve Conductor Protection, Prevent Radio Interference and Reduce Structure Costs

● To provide today's precious conductors with adequate protection from burning power arcs, O-B has developed two arcing horns offering several advantages over previously available designs. Both are made of pipe to eliminate sharp edges and are free of radio interference at voltages well above their recommended line ratings. And both offer better conductor protection because they are longer, have greater coverage and use larger, heavier metal sections than other designs. The Longhorn, intended for 115, 138 and 161-kv. lines, has a short socket eye to conserve string length and permit smaller clearances, thus saving on structure costs. The Figure 8 Bighorn, suitable for lines up to and including 230-kv., has a narrower lateral width than similar devices and does not require extra crossarm length to obtain adequate ground clearance. This design also permits full use of the flashover value of insulators and therefore is more efficient. If you're planning a new high-voltage line or considering improvements for any old transmission lines, it will pay to investigate these distinctly different conductor protectors. Just post a request and we'll gladly send you more details.

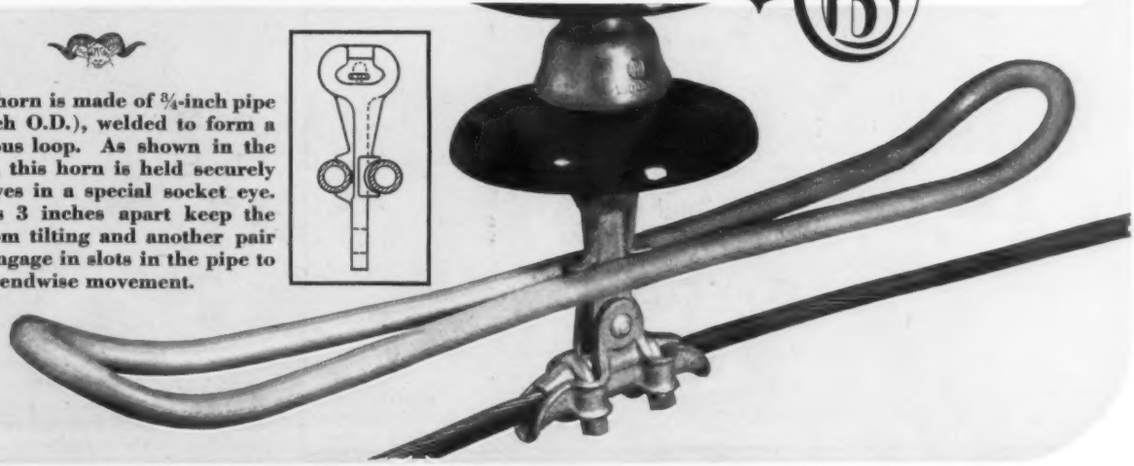
Ohio Brass

MANSFIELD, OHIO 2345-H

Canadian Ohio Brass Co., Ltd., Niagara Falls, Ont.

WIN WE MUST AND WILL B

The Bighorn is made of ¾-inch pipe (1.05-inch O.D.), welded to form a continuous loop. As shown in the drawing, this horn is held securely by grooves in a special socket eye. Two fins 3 inches apart keep the horn from tilting and another pair of fins engage in slots in the pipe to prevent endwise movement.



Stop "Dead Lamp" Sabotage

with LLOYD NO-BLINK STARTERS

NO-BLINK FS-4 NA

FS-2 FS-4 Certified by ETL - Spec. 6

Prevent breakdown of ballasts, condensers, tubes and starters themselves.
Prevent "flicker" and "blink".
Start quicker—Work better . . . longer.

Listed and Approved by Underwriters' Laboratories, Inc.
Listed and Approved by Canadian Engineering Standards Association.
Certified by Electrical Testing Laboratory—Spec. 6
Certified to Fleur-O-Lier Standards

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Box C—Edgewood Sta., Providence, R. I.
Representatives, Branch Offices, Warehouse Stocks in 23 Leading Cities

Lloyd Policy Insures Quality

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Connectors—Lugs—Terminals

U. S. GRAPHITE CO.
Motor and Generator Brushes

MARWOOD LIMITED
357 Ninth St., San Francisco, Calif.

Los Angeles Portland Seattle

Line Truck (812)

Chrysler corp. recently announced a new Dodge Job-Rated 1½-ton tractor, semi trailer unit for line work. It is claimed that these trucks are designed for use in both congested areas or in wooded rural districts. The fifth wheel of the assembly permits detaching the trailer for maximum maneuverability in congested areas, it is stated, and couplings on the rear permit easy attachment of a pole carrier.

There is said to be ample space for carrying materials and equipment and an enclosed compartment in the forward part of the trailer protects the crew from the weather while traveling. Latest safety features have been embodied in the design, it is claimed.

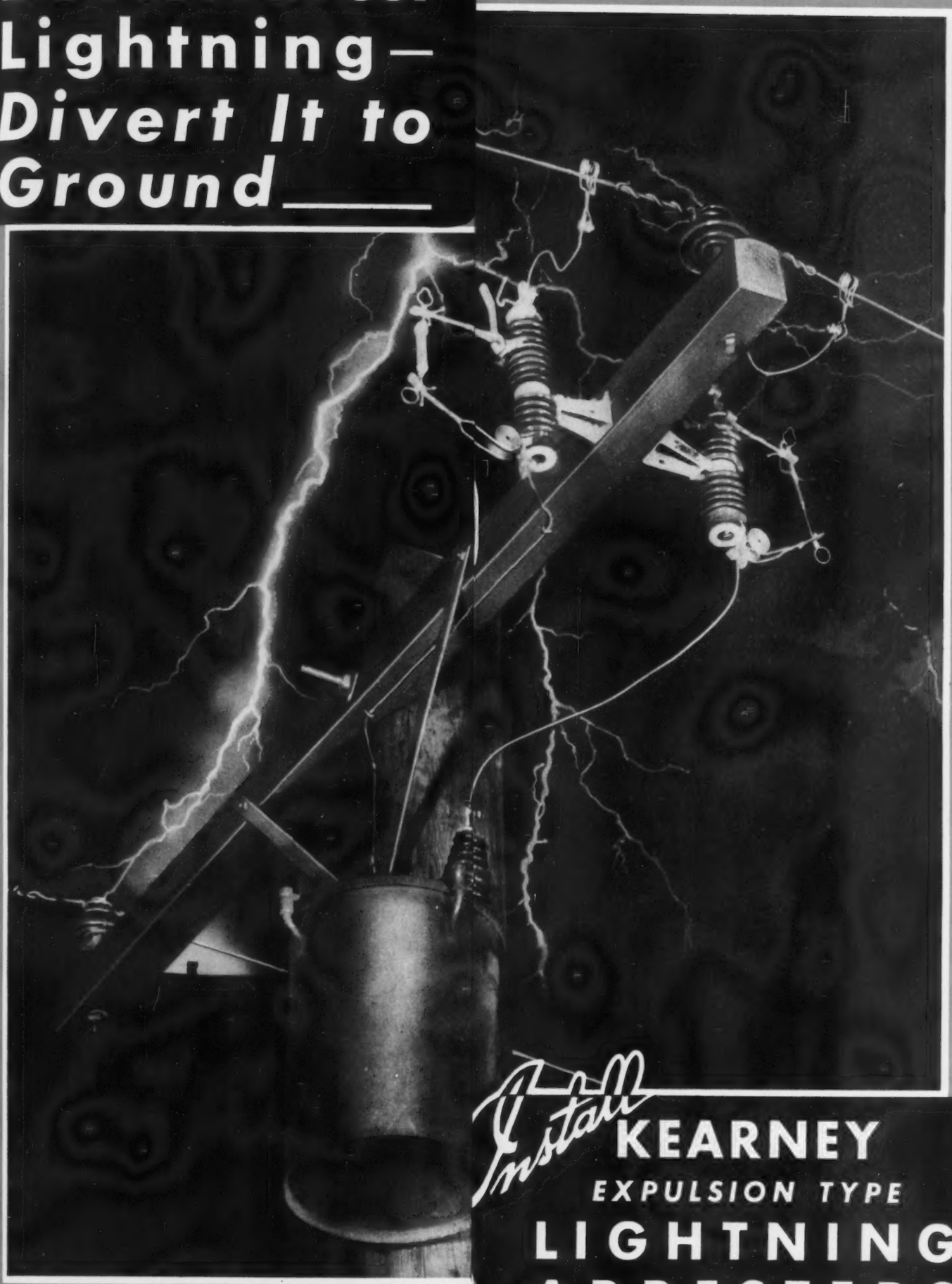
Westinghouse P-14 Unit (813)

P-14 portable AC and DC instruments have been announced by Westinghouse Electric & Mfg. Co. for general field use where an inexpensive unit is required. Features claimed for the new units by the manufacturer are modern design, accuracy, sturdiness and reliability.

The molded cases are fully insulated and magnetically shielded from stray field influences according to the announcement. The instruments are available either with or without covers. Scale length is 3.2 in. AC and 2.8 in. DC and the units are said to have an accuracy of plus or minus 1% of full scale. A mirrored dial and knife-edge pointer are aids in making accurate readings.

The P-14 embodies a variety of single and multi-ranges providing for the measurement of AC volts, amperes and milliamperes; DC volts, amperes, milliamperes and mioro-amperes. Ranges and combinations of ranges have been chosen to meet needs of test men, laboratory technicians and research engineers, according to the manufacturer.

Do Not Arrest Lightning— *Divert It to Ground*



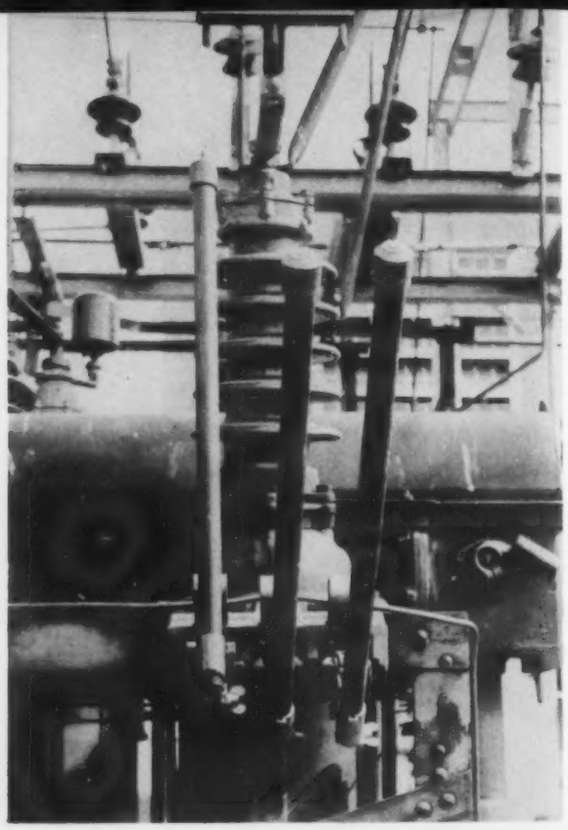
Install **KEARNEY**

EXPULSION TYPE

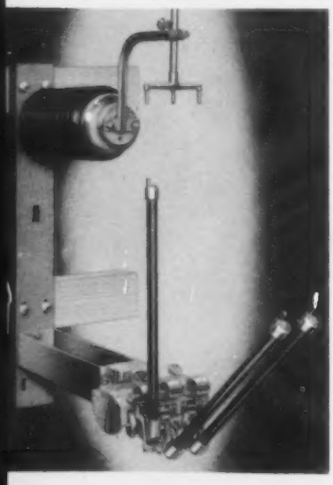
LIGHTNING ARRESTERS

Inside information inside ▶

SPLIT-FOLD INSERT PAT. APPL'D FOR



Protect Equipment at Large Stations and Substations



KEARNEY Repeating Fused Gap Arresters are used to reduce circuit breaker operation—protect equipment at large stations and substations. They supplant straight rod gaps which provide protection but which also cause breaker operation at each flash over. Adjustable air gaps on these Arresters allow for an exacting degree of apparatus protection. Cartridges are fused to provide a positive path to ground. Five ampere fuse links are used to permit sufficiently fast interruption to clear the circuit before oil circuit operation operates.

The units are recommended for attended stations or those stations having daily inspection as they have only three cartridges.

FOR BETTER MAINTENANCE and CONSTRUCTION—

LIGHTNING CHARGE—UNARRESTED—G

Follow-Current Rides Lightning to Expulsi

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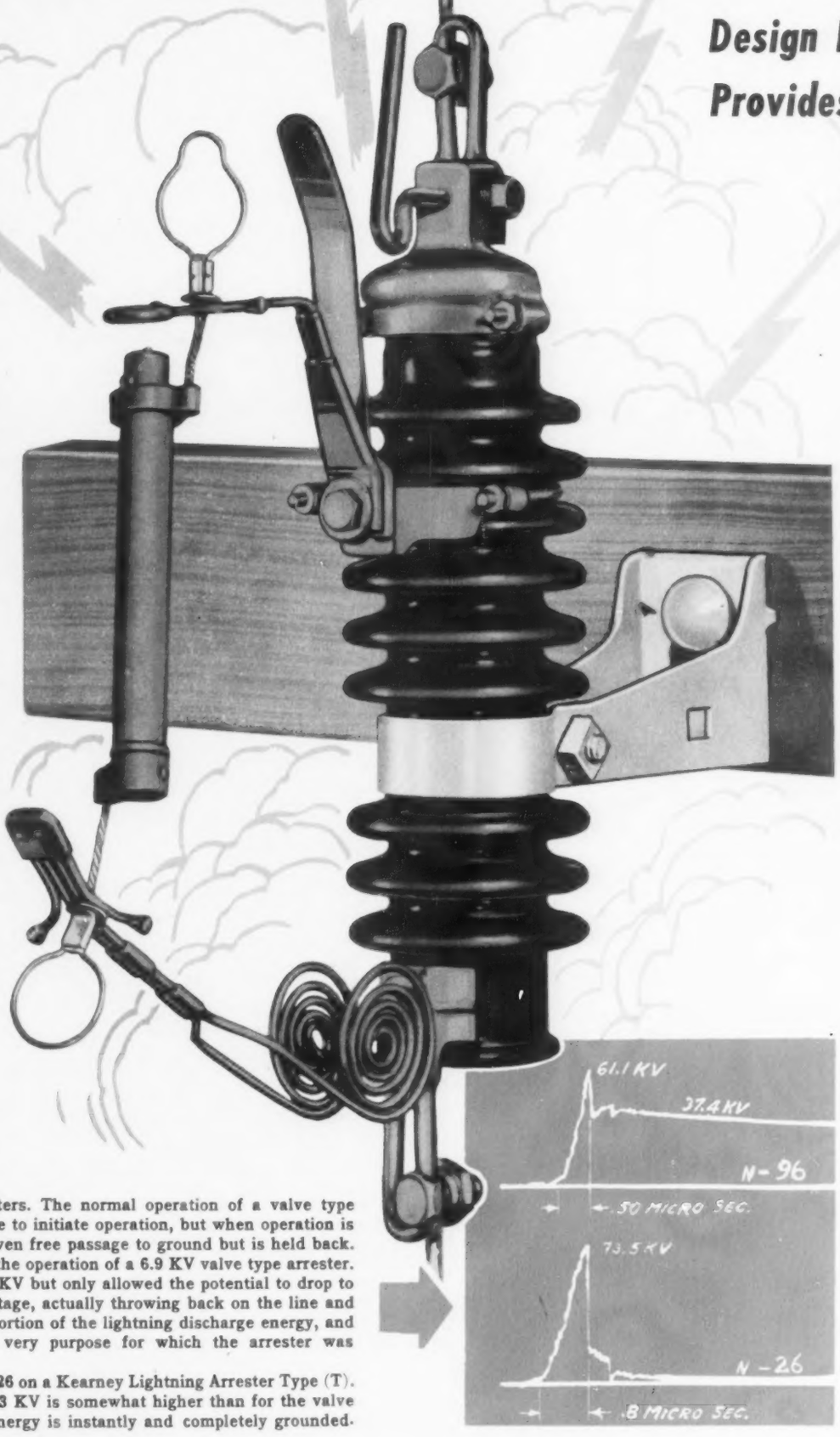

ABOUT THE AIR GAP

When a lightning charge comes on the line, it follows a path down onto the arrester, along the arcing horn, on the arrester unit insulator, across the air gap and onto the arcing horn of the expulsion tube. In crossing the air gap on the insulator, the lightning charge provides a bridge for the follow-current to also travel over onto the Lightning Arrester expulsion tube.

EXPULSION TUBE GAP

Follow-current rides lightning charge until it reaches second gap within the expulsion tube. Here's the parting of the ways: Lightning charge continues on path direct to ground to be completely neutralized without restriction. Follow-current-stops at the gap at first current zero.

BACK TO LINE WORK

Follow-current, having failed to reach ground or cause an interruption goes back to job immediately. Current continues on line to perform its regular, normal service.

GRAPHICALLY SPOKEN

Figure 1—Impulse generator shots recorded by Cathode Ray Oscillograph show the characteristic operation of a Kearney Lightning Arrester, Type (T), compared with the conventional valve type arresters. The normal operation of a valve type arrester requires a high voltage to initiate operation, but when operation is started the discharge is not given free passage to ground but is held back.

Refer to N-96. This shows the operation of a 6.9 KV valve type arrester. It started to discharge at 61.1 KV but only allowed the potential to drop to 37.4 KV, 5.4 times normal voltage, actually throwing back on the line and its equipment a considerable portion of the lightning discharge energy, and to that extent defeating the very purpose for which the arrester was installed in the first place.

Compare this with shots N-26 on a Kearney Lightning Arrester Type (T). While the discharge point of 73 KV is somewhat higher than for the valve type arrester, the discharge energy is instantly and completely grounded.

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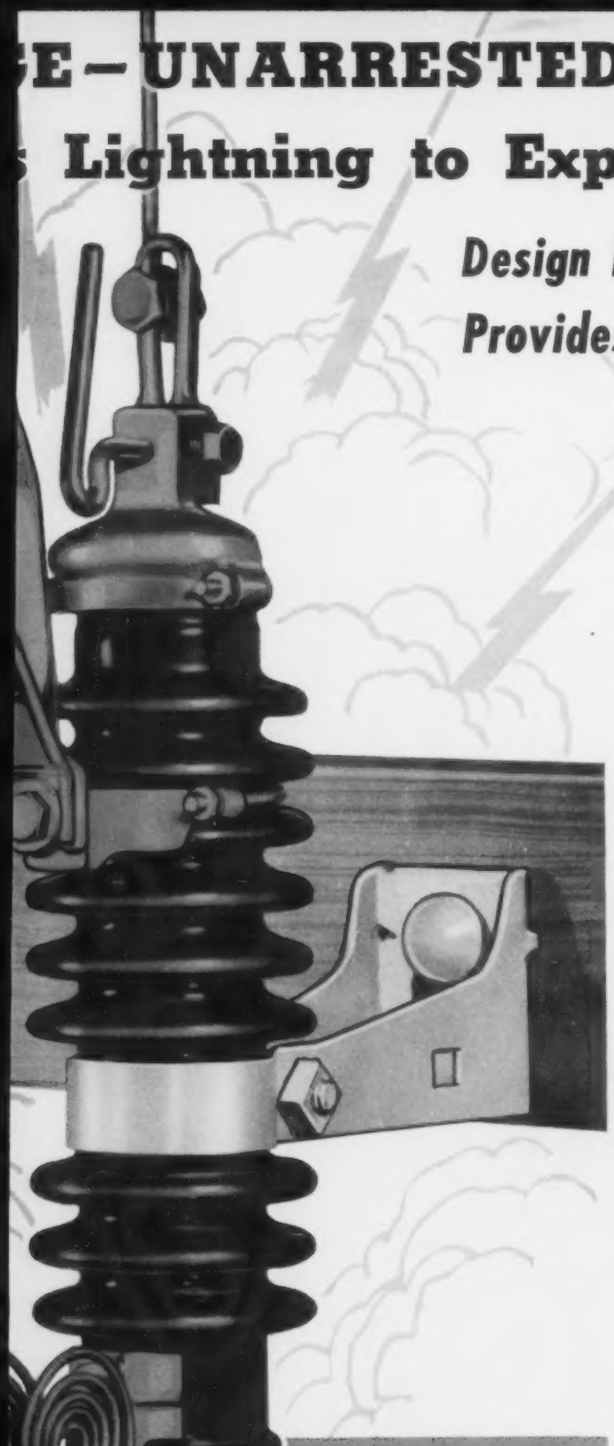

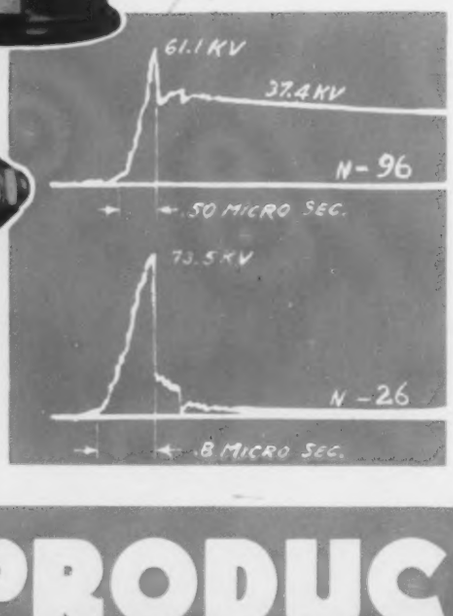

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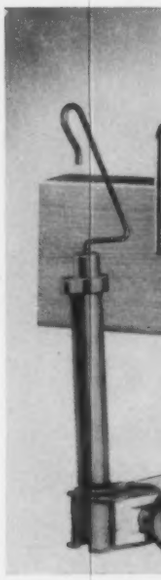

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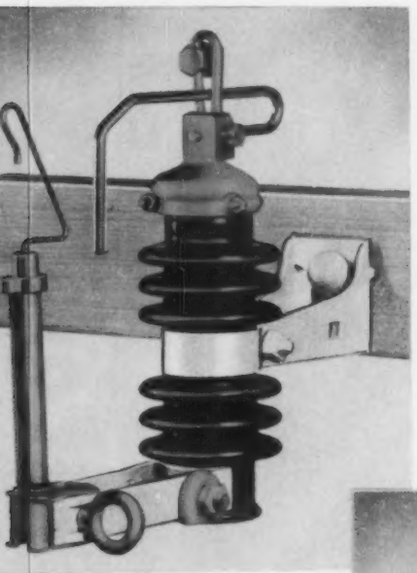
Y PRODUCTS-

Goes Direct to Ground:
sion Gap — Then Stops

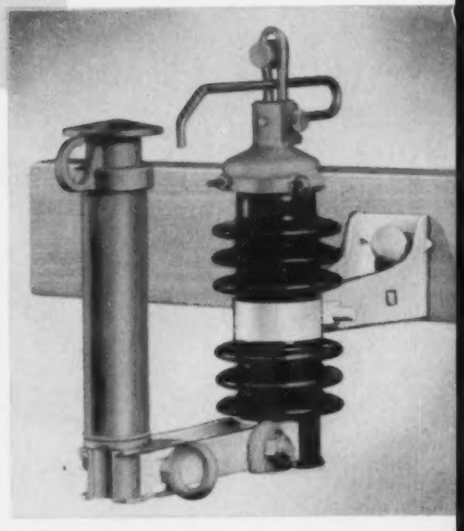
iple of Kearney Lightning Arresters
ctical Protection at Very Low Cost

ON'T ARREST Lightning — let it get off your lines and away from equipment — diverted to ground as t as possible . . . Your follow-current — surely you want stop that and prevent it from sustaining an arc to ground. Kearney Lightning Arresters perform these two impor- t functions: permit lightning charge, unarrested, to direct to ground . . . Stop follow-current at the gap in Lightning Arrester Expulsion Tube and thus prevent e or switch operation.

The illustration and description at the left shows the nciple of operation of the Kearney Lightning Arrester. k a Kearney Representative for details, or write factory.



THE TYPE P. T. LIGHTNING ARRESTER. This Type of Lightning Arrester is equipped with a stationary Expulsion Tube Gap that operates in the same manner as the Expulsion Tube Gap, resiliently mounted on the Type T Arrester, shown in the large illustration. With an impulse value rated at 27,066 amperes, this arrester, too, is capable of handling up to 98.8% of recorded lightning charges made on power lines.



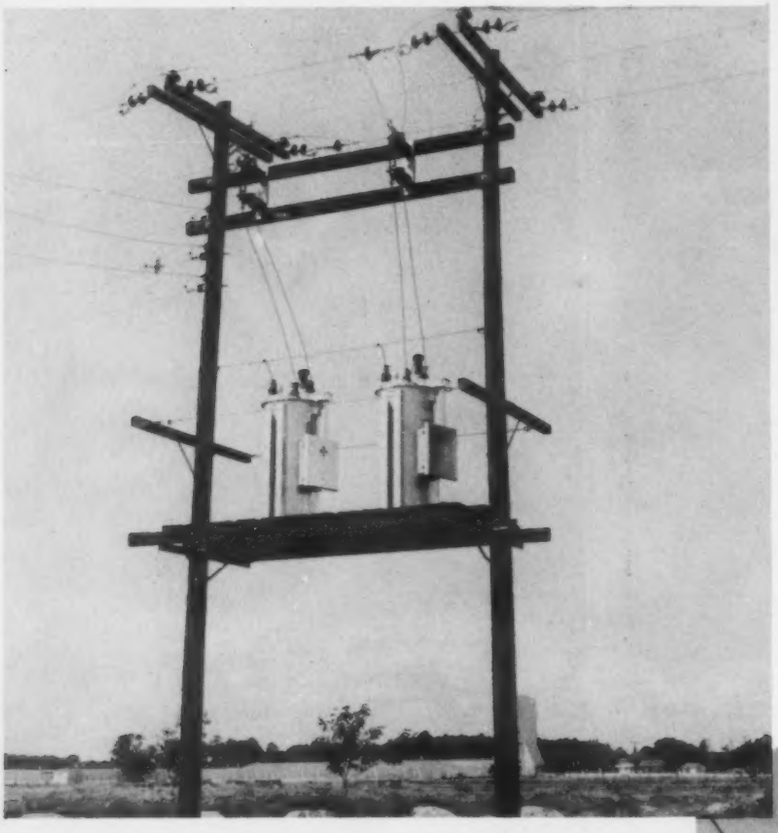
TYPE P LIGHTNING AR-TER. Kearney Type P Arresters, sing the Expulsion Tube Gap prin- but of heavier construction, are ed for heavy duty, with an impulse of 41,200 amperes and a follow- nt rating of 3000 amperes. The P Arrester is recommended for use e line to ground short circuit cur- s of relatively high value.

three types of Kearney Lightning ters have an external air gap which nts "freezing" on light capacity lines e of destructively high direct strokes.

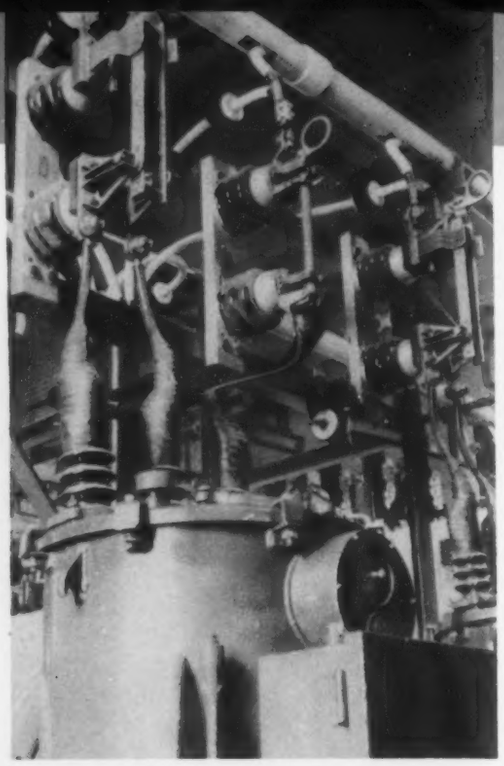
S-

JAMES R. KEARNEY CORPORATION
4236 CLAYTON AVE. - ST. LOUIS, MO.
Canadian Plant • Toronto, Canada

SEVERAL KEARNEY AIDS FOR DEMANDS OF TODAY

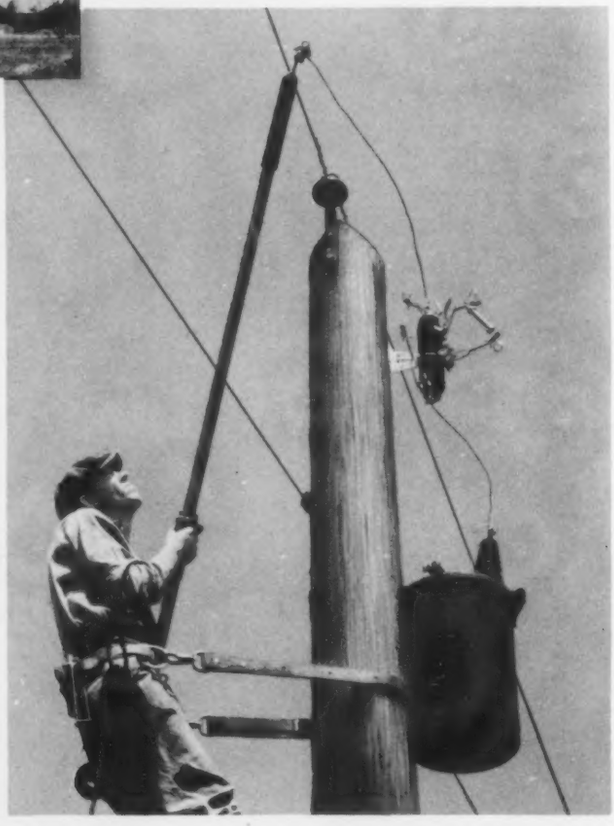


SIMPLIFIED OPERATION and increased safety has been accomplished by installing two 15 KV, 200 ampere, No. 8822-1 Kearney Regulator By-Pass Switches on this construction. Two regulators on a delta circuit or three regulators on a wye circuit can be installed.



BY-PASSING two single phase induction feeder regulators, connected in open delta connection was handily accomplished as shown above. Kearney No. 7716 By-Pass Disconnects and No. 6822 Hook Operated Disconnects were used on this job.

A SAFE PRACTICE that alert operating men are watching, more than ever, these days is proper and safe grounding. Kearney Grounding Sets, such as shown below, are furnished with poles that can be detached to permit minimum storage space on the trouble truck.



INTO SERVICE goes a combination Kearney Lightning Arrester and Trip-O-Link Fuse Switch to provide inexpensive fault and lightning protection. The connection is securely made by means of a Kearney Con-nec-tap Clamp, quickly and safely installed by means of a Kearney No. 4255-1 Saf-T-Hook Stick.

There's Further Information—
about Kearney Products Within This Insert

Protect Your Lines with
KEARNEY EQUIPMENT

BULLETINS

data books, etc.

Electric Motor Care (814)

A maintenance handbook, "Guide to Wartime Care of Electric Motors," has been released by Allis-Chalmers Mfg. Co. Pointing out that working time of the average motor has been increased from 1,800 to 8,700 hours a year and that the present "suicide schedule" is taking many a rotor the equivalent of a round-the-world trip every eight days, the manufacturer tells operators what to do now that maintenance "as usual" is out for the duration.

Covered are nine electric motor enemies, including dust, moisture, stray oil, friction, vibration, misalignment, uneven wear, overload and underload. Last section of the booklet is a "Quick Diagnosis of Motor Ailments," broken down into symptoms you can see, feel and hear, with possible causes and cures.

The text, aided by cartoons, tells why improper removal of dust can do as much harm as dust itself; five ways to dry out motors—without damaging insulation; how to correct misalignment "by ear" and other information useful to the maintenance man.

Accelerating Unit (815)

Electric Controller & Mfg. Co. has issued a bulletin on its Neo-Time-Current accelerating unit. This unit is used to control automatically the closing of the acceleration contactors which short-out resistance in the secondary circuit of the AC wound-rotor motor. According to the manufacturer, timing is such that each accelerator closes after the proper interval of time so as to increase motor torque as required to accelerate the load. The enclosed unit is mounted and wired as an integral part of each starter.

Operating Suggestions (816)

A manual giving practical suggestions on getting better service from maintenance materials has been published by Johns-Manville. Called "101 Suggestions for Good Operating Practice," the guide outlines ways to lengthen the life of packings, insulations, roofings, friction materials and refractory products.

Voltage Regulators (817)

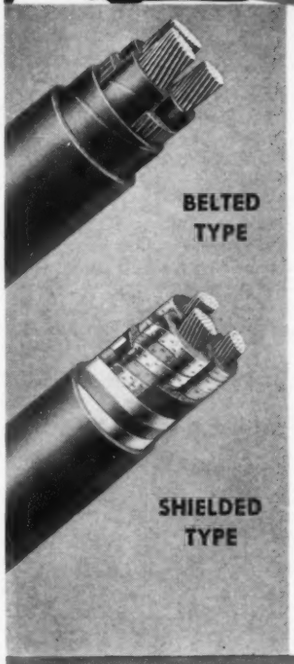
Westinghouse Electric & Mfg. Co. has announced an 11-page bulletin describing air-cooled induction feeder voltage regulators of from 12 to 24 kva. The booklet discusses electro-dynamic braking phase angle adjustment and a new regulating relay. Operation and construction details are covered.

Burndy Pocket Catalogue (818)

A pocket catalogue "for the man on the job" has been issued by Burndy Engineering Co., Inc. The 48-page booklet contains data and illustrations of 75 electrical connector types; listings and partial listings of important connector sizes; a page of wiring data.

Ohmite Stock Catalogue (819)

Ohmite Mfg. Co. has prepared a new stock catalogue listing its line of rheostats, resistors and tap switches. Descriptions, illustrations and prices included.



● Yes, there are many applications today where Paper Insulated Cables are being used in place of rubber. And whether they're drawn into conduits, hung from messenger strand or buried directly in the ground, Roebling Paper Cables have records of performance which prove their reliability, operating efficiency and low cost.

Available in single and multiple conductor, in regular strand (round or sector) and Compack (round or sector). Made to purchaser's specifications and to meet the requirements of design, manufacture, tests and guarantees of the specifications for Impregnated Paper Insulated Lead Covered Cable, "Solid Type", Association of Edison Illuminating Companies. Excellent materials, fine workmanship, careful processing and thorough testing are assurance of satisfactory performance in service.

BELTED TYPE Cable may be used for phase to phase voltages up to 20kv.

SHIELDED TYPE Cable is particularly adaptable for three phase grounded neutral circuits from 13 to 35kv.

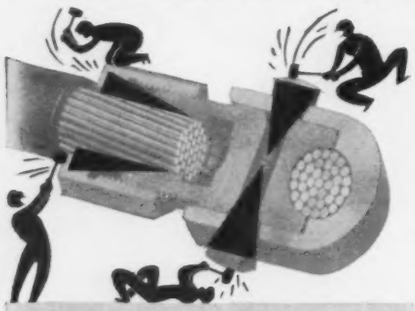
JAR ROEBLING

JOHN A. ROEBLING'S SONS COMPANY OF CALIFORNIA

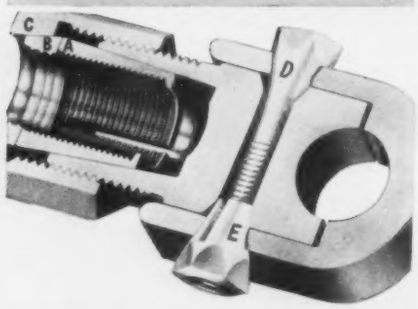
San Francisco • Los Angeles • Seattle • Portland

Did You Know

since time immemorial, the wedge has been the orthodox method of tightening and permanently joining two bodies together?



"Gorilla Grip" mechanical connectors use two types of this wedging principle.



The long-bodied, fine-threaded nut (c), the soft copper serrated sleeve (a), and the hard brass lockring (b) tapered with the same taper as the nut are used in what is known as the Terminal Unit of the Connectors.

This Terminal Unit is machined to snug and compact the wires and cables as the nut is tightened on the thread of the body. This wedging action makes a mechanically as well as electrically perfect connection.

The tapered head bolt (d) and nut (e) on the yoke and body of the fittings draws these two members over the cable providing perfect electrical contact. Pressure is uniformly distributed over the full contact area and simultaneously locks the parts into position.

Write for our booklet which illustrates these mechanical principles in more detail.

National Electric
PRODUCTS CORPORATION
1300 Fulton Bldg. Pittsburgh, Pa.

Maintenance Books (820)

Available to maintenance men is a two-volume set of rules and suggestions for the care of electrical apparatus in industry, prepared by Westinghouse Electric & Mfg. Co. The books total 220 pages and include 15 chapters for loose-leaf insertion in 5 x 7-in. binders.

Volume One covers inspection of electrical apparatus; insulation materials and applications; cleaning, drying and testing of insulation; commutator maintenance; starting and regulating AC, DC and squirrel cage induction motors. Volume Two is devoted to contactor maintenance; inspection of transformers; and a chapter on transformer connections. Wiring diagrams include the more common connections for two and three phase, 25 and 60-cycle, power transmission.

Indicating Instruments (821)

DC and AC indicating instruments for mounting on switchboards are described by the Roller-Smith Co. in a 12-page catalogue recently published. These instruments include DC ammeters and voltmeters and AC ammeters, voltmeters, wattmeters, frequency and power factor meters, synchroscopes, rectangular triplex ammeters and horizontal edgewise triplex ammeters. Round surface mounting and square surface or flush models are listed and described. Dimensions, weights and list prices included.

Wiremold F Units (822)

Publication of a new catalogue and price list covering Wiremold "V"-Type Cover Fluorescent Units and Line-O-Lamps has been announced by the manufacturer. A further development of the Wiremold "3000" System for wiring and lighting, this equipment can be installed either as individual units or continuous row lamps. Future additions or extensions are provided for by means of interconnecting fittings, the manufacturer states.

Hipersil Transformer Core (823)

Self-protecting CSP distribution transformers with Hipersil core are the subject of a booklet being distributed by Westinghouse Electric & Mfg. Co. Hipersil, according to the manufacturer, is applied to transformers to secure maximum benefit in reduced size and weight, improved regulation and increased short-time overload capacity. Diagrams are used to illustrate the principle of overload and insulation protection.

Dry Type Transformers (824)

R. E. Uptegraff Mfg. Co. has published a 16-page catalogue on its Dry Type Transformers. Type E and Type DA units are illustrated by drawings and photos, and descriptive data for each type is included.

Curtis Lighting Units (825)

Curtis Lighting, Inc., has issued an 87-page catalogue listing and describing fluorescent and incandescent equipment. Footcandle data, coefficients of utilization charts, specifications and other information included for both industrial and commercial installations. Fixtures and installations are pictured. Section headings: Industrial lighting; CurtiStrip Wiring Channel; Fluorescent CurtiStrip; Office Lighting; Troffer Lighting; Indirect Lighting (Incandescent); Recess Lighting (Incandescent); Show Window Lighting (Incandescent); Special Designs; Reflection Surfaces and Finishes; Illumination Data.

Wheelco Instruments (826)

Bulletin Z6000 issued by Wheelco Instruments Co. lists that manufacturer's line of measuring and control instruments. The 16-page pamphlet describes and illustrates unit construction of temperature controllers and explains the "electronic principle" for effecting control without contact between the measuring and control functions of the instrument. Remote controllers, combustion safeguard equipment and other instruments are covered. Price list.

BullDog Catalogue (827)

BullDog Electric Products Co. has issued Catalogue 426, superseding No. 421 published last January. Chief change in the new catalogue, according to the manufacturer, is the elimination of certain items, dropped in the interest of simplification and conservation of critical materials. Listed are safety switches; service equipment; Kbl-Duct; lighting panels; SAFtoFUSE Panels; Vacu-Break Switchboards; Circuit Master and other circuit breaker panels; miscellaneous devices. Price list and index included.

ELECTRICAL WEST, 68 Post St., San Francisco, California.
Please send me the following CIRCLED items:

800	801	802	803	804	805	806	807	808	809
810	811	812	813	814	815	816	817	818	819
820	821	822	823	824	825	826	827		

Name..... Company*..... Title*.....

Address .....

* Please include your company's name and your position, as we cannot ask manufacturers to furnish literature unless you do.

NEED MOTORS FOR WAR WORK?

4 things to do to get them quicker

YOUR AID ON THESE 4 POINTS WILL HELP US PRODUCE AND DELIVER MORE MOTORS

Tri-Clad motors are available in a full range of sizes from 1 to 100 hp. Your General Electric representative can supply complete information and help you get the Tri-Clad motor to do your job. *General Electric, Schenectady, N. Y.*

Your choice of G-E Tri-Clad motors will give you *extra protection* against (1) physical damage, (2) electrical breakdown, (3) operating wear.

General Electric and its employees are proud of the Navy award of Excellence made to its Erie Works for the manufacture of naval ordnance.

SPECIFY TRI CLAD MOTORS

GENERAL ELECTRIC

Use standard, open, sleeve-bearing motors whenever possible

The standard Tri-Clad motor, though classed as an "open" motor, is so well protected that it gives good service on many jobs where special motors often were recommended.

Sleeve-bearing motors often can be supplied more readily than ball-bearing types because of the present demand for ball bearings on other war equipment. Use ball-bearing motors only where load or mounting conditions require them.

Special end shields and other modifications may result in delay for you and others.

Consider the use of standard or multispeed a-c motors in place of d-c motors wherever this alternative is possible.

order motors early . . . giving complete specifications

Place motor orders when you order the machines they are to drive.

If you are planning motor drives for conveyors or other equipment for new plants, place the orders as soon as design work indicates the motor requirements.

Avoid delay and mix-ups by giving complete specifications, preferably on an order form which your G-E motor representative can supply.

give complete priority information, properly endorsed

The filling of many motor orders is delayed because of incomplete priority information. If in doubt about details, call the nearest G-E office.

When placing orders for motors, be sure that complete priority data accompanies *each order* in the form of certificates, endorsements properly signed, etc. The priority is not effective in scheduling shipment until it is received by your supplier.

Your needs and the war effort are best served by using the proper priority rating assigned by the War Production Board for the job involved, and requesting delivery no earlier than actually required.

Under the Production Requirements Plan, builders of motor-equipped machines for subsequent sale may order their requirements in advance.

check with G.E. for delivery from local warehouse stocks

To meet urgent war needs, a supply of standard Tri-Clad motors is maintained at G-E factories and local G-E warehouses. Perhaps the motor you want, or can use with a few simple changes, is available for immediate shipment.

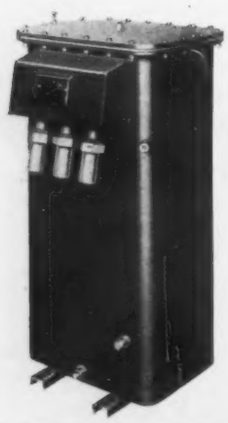
Your local G-E motor representative can furnish information on motors which may be in stock in the following cities:

Atlanta, Ga.
Boston, Mass.
Buffalo, N. Y.
Charleston, W. Va.
Chicago, Ill.
Cincinnati, Ohio
Cleveland, Ohio
Dallas, Texas
Davenport, Iowa
Denver, Colo.
Detroit, Mich.
Houston, Texas
Kansas City, Mo.
Los Angeles, Calif.
Milwaukee, Wis.
Minneapolis, Minn.
New York, N. Y.
Oklahoma City, Okla.
Omaha, Neb.
Philadelphia, Pa.
Pittsburgh, Pa.
Portland, Ore.
St. Louis, Mo.
Salt Lake City, Utah
San Francisco, Calif.
Seattle, Wash.

Three BIG reasons why you'll like this NEW

L-M SUBWAY TRANSFORMER

It's an operating man's transformer . . . core to cover! Operating men of a leading power company helped us design it, suggested many of the practical new mechanical features this new L-M Subway Transformer brings you. The result is a transformer you'll like from the start . . . for three big reasons:



1 NEW MECHANICAL CONNECTIONS

The new mechanical cable connectors in the L-M Subway Transformer eliminate the troublesome, costly solder job needed in other designs. Connectors are positioned so you need not bend the cable. Simply push the cable through the wiping sleeve straight into the connector, tighten the nut, and the firmest kind of a connection is permanently made.

2 AIR TIGHT, WATER TIGHT

L-M Subway Transformers are absolutely moisture-proof. Every transformer after assembly is tested for 24 hours with air pressure at 7 lbs. per sq. inch . . . and only an absolutely air tight, water tight unit gets the O. K. tag. Non-corrosive, heavy copper bearing steel tanks, all-welded seams, precise gasketing throughout, a heavy steel plate cover, and scientifically designed wiping sleeves all contribute to the absolute moisture proofness of the L-M Subway Transformers.

3 SOUND BASIC DESIGN

The L-M Subway Transformer is typical of all L-M Transformers in ruggedness of coil and core, good insulation, cool running characteristics, and the inherent stamina to withstand long, hard usage. Overall dimensions, too, are in keeping with the compact requirements of efficient underground construction.

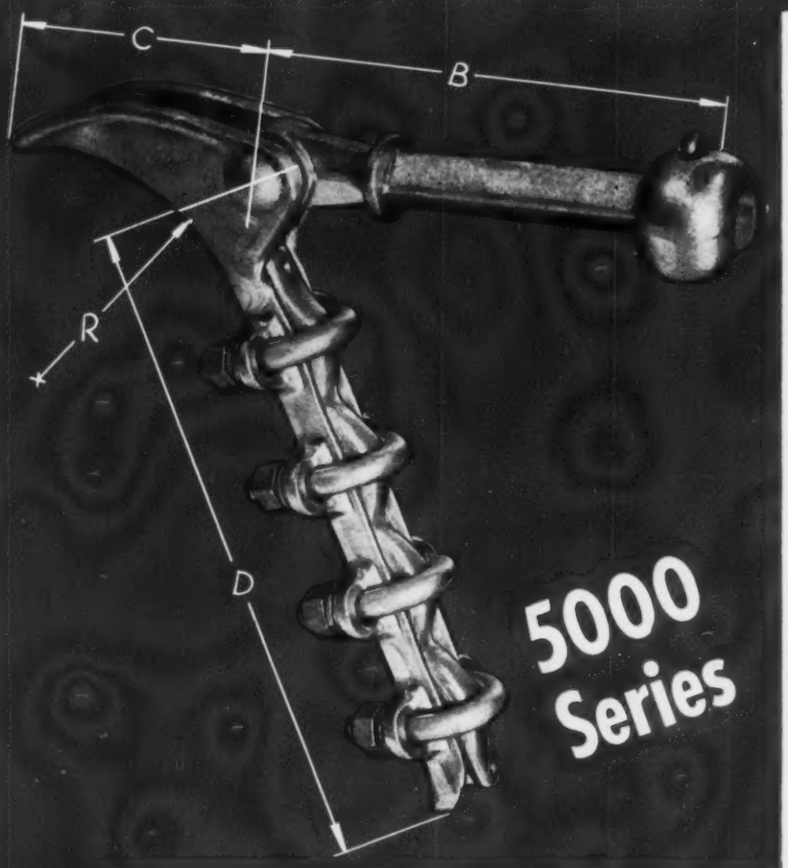
L-M Subway Transformers are available in the 2400-120/240 volt class, 5 to 200 Kv-a.

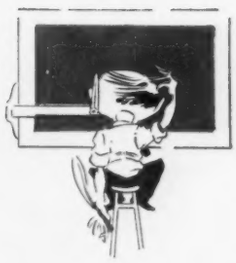
NEW BOOKLET TELLS YOU FULL FACTS

The new, illustrated Bulletin No. ST-429 gives you complete data on design, oil capacities, overall dimensions, and all new features of the L-M Subway Transformers. Write for your copy today to Line Material Company, 802 North 8th Street, Milwaukee, Wisconsin.

LINE MATERIAL COMPANY

DESIGNING A TRANSMISSION LINE?





We can help you on CONDUCTOR STRAIN CLAMPS

Although BTC CLAMPS and HI-LINE HARDWARE are sold exclusively through the Insulator Manufacturers, we welcome cooperation with the Transmission Engineer in his selection of these important items.

The following essential data will enable us to offer the right Conductor Strain Clamps—

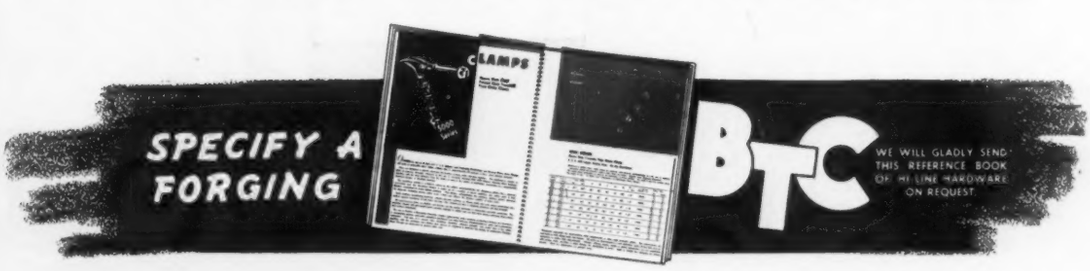
Conductor Material—Copper, A.C.S.R. or other Composites
Conductor Manufacturer
Conductor Type, Design Number or Stranding —Standard Concentric Stranding, or the newer "Hollow Copper" Expanded Diameter types such as General Cable Type HH, Anaconda I-Beam Core, Copperweld Composite Type S or V, Phelps-Dodge Stranded-Tube Core, or similar cables. In the case of "Hollow Copper" Types, some Cable Manufacturers have approved the use of Snubbing or Quadrant Type Strain Clamps — others prefer and generally supply Straight-Line Compression Strain Clamps—Consult your Cable Manufacturer on this one.

Conductor Diameter and Ultimate Strength

Liners — The use of soft copper or aluminum liners in Clamp bodies and keepers is recommended, especially on "Hollow Copper" and A.C.S.R. conductors. Concentric Stranded Copper is generally dead-ended in unlined Clamps. Copper and aluminum are critical war-winning materials. Consult your Cable Manufacturer on this liner question.

Why not tear out this page and file it for future reference?

The Brewer-Titchener Corporation, Cortland, New York



L. H. "Barney" Koogle, salesman, General Electric Supply Corporation, Denver, Colo., who covers the New Mexico and southwest Colorado territory is here on his way to discuss Moncor Surface Wiring Devices with contractor handling wiring of temporary housing project. Mr. Koogle checked over the housing plans in preparation for this meeting.

R. S. Belnap (left), branch manager, General Electric Supply Corporation, Boise, Idaho is helping W. H. Harbert, owner of the City Electric Co., Boise "take off" materials needed for completion of wiring at one of several rush jobs Mr. Harbert is handling.

F. M. Hatton (center left), Hendrie & Bolthoff Mfg. and Sup. Co., Albuquerque, N. M., G-E distributor is here showing a switch box to Oscar Conwell, contractor, suitable for rush job he is handling. C. P. Bowman (extreme left) Hendrie & Bolthoff and Henry B. Davis (right), helper for Mr. Conwell look on.

See the G-E WIRING MATERIALS DISTRIBUTOR

in Your Neighborhood for War Project Wiring Supplies

Wherever you are, there is a G-E Wiring Materials Distributor near you. These distributors are located at key points all over the country. They are eager to cooperate in aiding the war effort . . . eager to help in solving wartime wiring problems.

Ask a representative of the G-E Wiring Materials Distributor near you to call. He'll be glad to give advice on priority matters and will help you select suitable materials for new wiring systems or wiring systems that you are modernizing. His experience enables him to make helpful suggestions on special purpose wiring too.

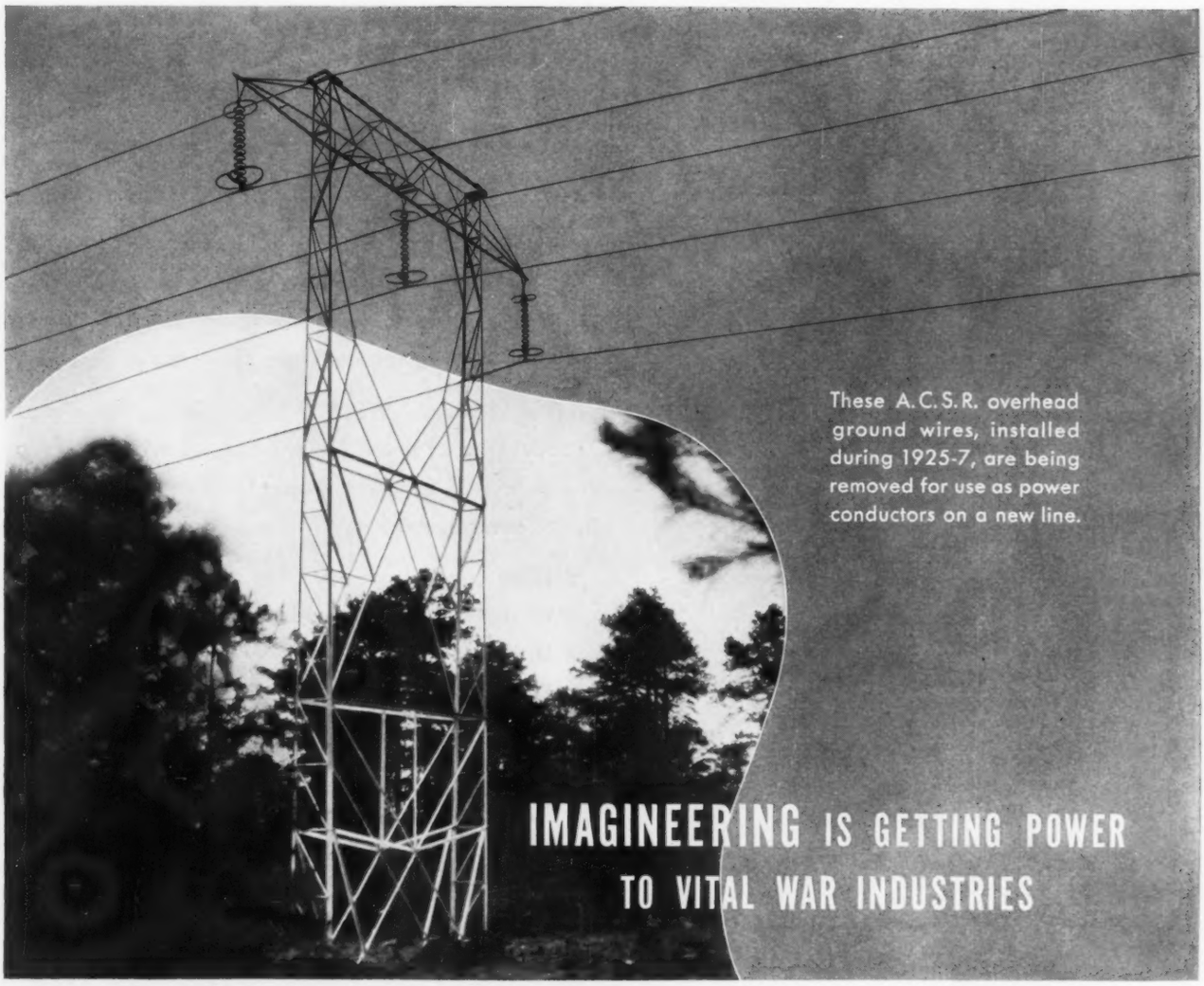
Conduit, boxes and fittings, wires and cables and wiring devices handled by G-E Wiring Materials Distributors are all high quality. Included in the line are materials needed for wiring any type of war project.

A field force of G-E district representatives help distributors serve customers in all parts of the country. Here is E. G. Hall who covers southern California and Arizona.

G-E WIRING MATERIALS INFORMATION

See your G-E Wiring Materials Distributor for full information on G-E conduit, wire and cable and wiring devices to meet your special needs. Appliance and Merchandise Department, General Electric Co., Bridgeport, Conn.

GENERAL ELECTRIC


These A.C.S.R. overhead ground wires, installed during 1925-7, are being removed for use as power conductors on a new line.
IMAGINEERING IS GETTING POWER
TO VITAL WAR INDUSTRIES

A.C.S.R. overhead ground wires have protected parts of this line for seventeen years. But they're being taken down now—for more urgent service—to be used as power conductors on a new line.

New conductors could not be obtained, so Imagineering by this power company's engineers found a way of serving additional vital war industries.

Imagineering is taking care of the future, too. Spans, towers, insulators and fittings are all planned so that this new line will accommodate new and larger conductors, when they again become available. Alcoa engineers are assisting in all of this design work.

When you have the problem of getting more work out of old lines, or of keeping them on the job, Alcoa engineers are always here to advise you. Write ALUMINUM COMPANY OF AMERICA, 2132 Gulf Building, Pittsburgh, Pennsylvania.

ALCOA ALUMINUM A.C.S.R.

A·C·S·R *Aluminum Cable Steel Reinforced*

ON RURAL POWER LINES AND HI-LINES

NO EXCUSES FOR UNNECESSARY OUTAGES

Service Interruptions Mean War Production Interruptions

● You can less afford unnecessary outages today than ever before. Man-power and time of servicing and replacing blown links make this prohibitive.

The elements of S & C Links are designed and constructed of silver, like the time-proven elements used in S & C Power Fuses. They *reduce unnecessary outages* and save time because they have:

- ★ **High surge capacity**
- ★ **Resistance to corrosion and deterioration**
- ★ **Uniform quality**
- ★ **Sustained accuracy of time-current characteristics**
- ★ **Greater mechanical strength**

S & C Universal Silver Fuse Links will save man-hours, truck-miles, and customer complaints. Can be used in all manufacturers' cutouts. Deliveries made from stock.

SCHWEITZER & CONRAD, INC.
4435 Ravenswood Avenue Chicago, Illinois
Manufactured in Canada by Powerlite Devices, Ltd., Toronto, Ontario

WESTERN REPRESENTATIVES:
SAN FRANCISCO — George E. Honn, 420 Market Street
LOS ANGELES — Farnham & Cunningham, Edison Bldg.
SEATTLE — T. S. Wood, 220 Ninth Avenue, North
SALT LAKE CITY — Riter Engineering Co., Kearns Bldg.

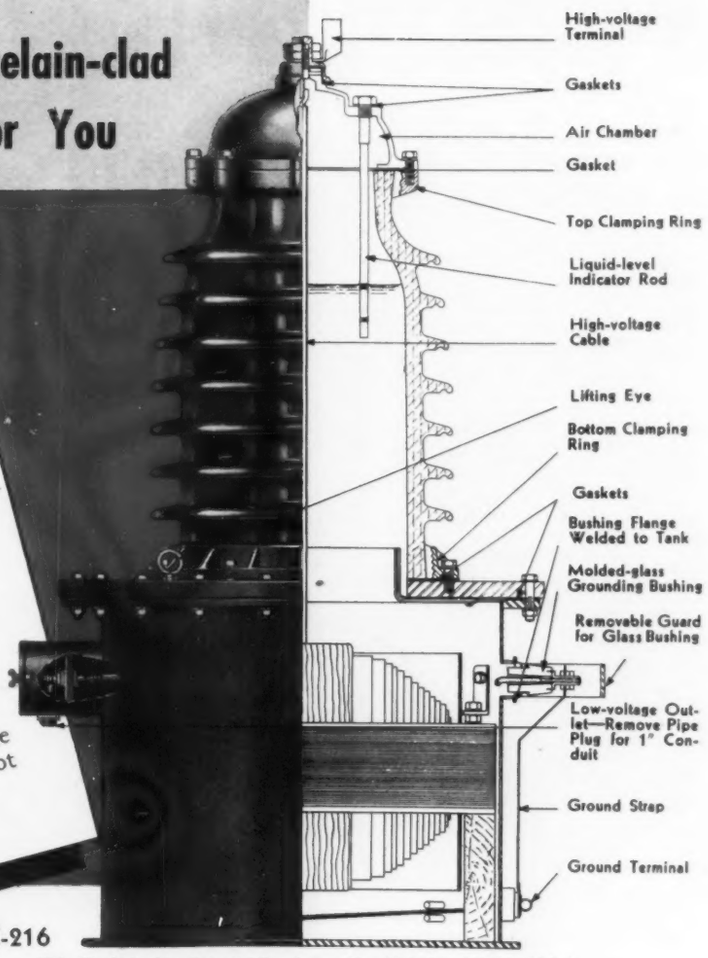
Here's What These Porcelain-clad Transformers Will Do for You

1. SAVE COPPER
Their light weight and small size (for the 69-kv unit, only 1100 lb and 4½ ft high) enable you to mount them in the steel structure and thereby reduce the length of copper runs.

2. SAVE SPACE
Mounting them in the steel structure saves valuable ground space.

3. SAVE FOUNDATION EXPENSE
Mounting in the structure also eliminates the need for constructing a separate foundation.

4. REDUCE MAINTENANCE
Hermetically sealed in, the insulating liquid need not be tested or inspected.



TYPE E-216

69-kv Single-bushing Potential Transformer (Availabl.. from 23 kv to 69 kv)

and you get these excellent operating characteristics!

ACCURACY—Well within the highest accuracy classification—¼W, ¼X, ¼Y, ¼Z—these transformers are suitable for both metering and relaying—line to neutral, on grounded and ungrounded circuits.

INSULATION—Impulse levels meet the test requirements established by ASA Standards.

IMPULSE FLASHOVER—The porcelain housing acts as a high-voltage bushing and has the same 60-cycle and impulse-flashover characteristics as the conventional-type bushing. For example, the following data apply to the 69-kv size:

60-cycle, dry, 1-minute-withstand test—175 kv
60-cycle, wet, 10-second-withstand test—145 kv
Full-wave-impulse-withstand test—350 kv

You can adopt G-E instrument transformers as standard throughout your system, for General Electric makes a complete line—indoor and outdoor, current and potential, and portable types.

For additional information about the E-216 or other types, address the nearest G-E representative. *General Electric, Schenectady, N. Y.*

The Navy "E", for Excellence, has been awarded to 92,780 General Electric employees in five plants manufacturing naval equipment

For the "Last Ounce" of Protection SPECIFY PYRANOL

Because these transformers are such a vital link in the protection of your system, you'll want to insist on Pyranol—the G-E insulating and cooling liquid which is chemically stable and will not sludge. Pyranol also means greater safety, for it is noninflammable and adds little to the price of the transformer.

GENERAL ELECTRIC

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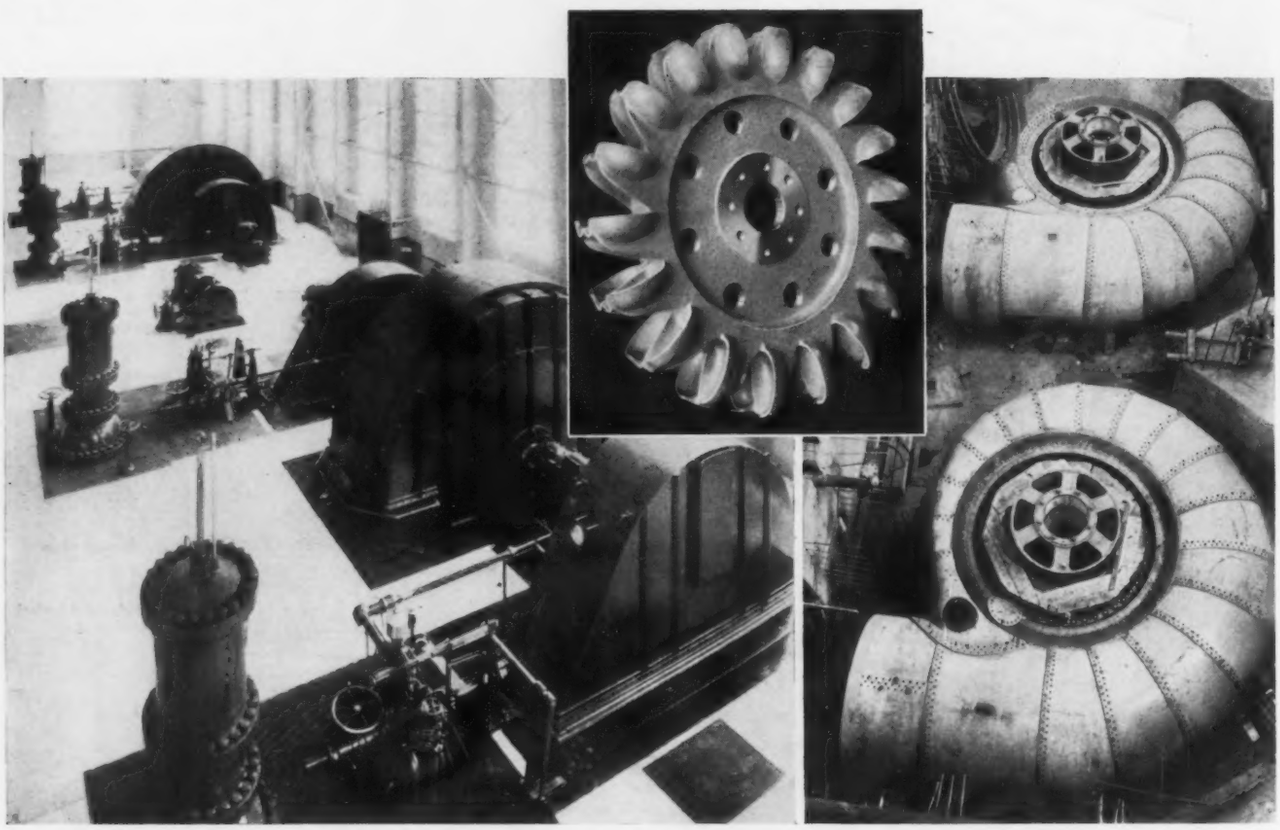
PELTON TURBINES deliver Knockout Jolts to Jap-nazi



They planned a war based on production.

The U. S. alone, is out-producing them.

And Pelton Turbines are helping deliver to the Jap-nazi the knockout jolts—the big "slugs" of power needed in 24-hour-a-day war-production plants.

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That is your assurance that your plans for the future use of Pelton installations will prove sound and make further contributions to dependable, low-cost power.

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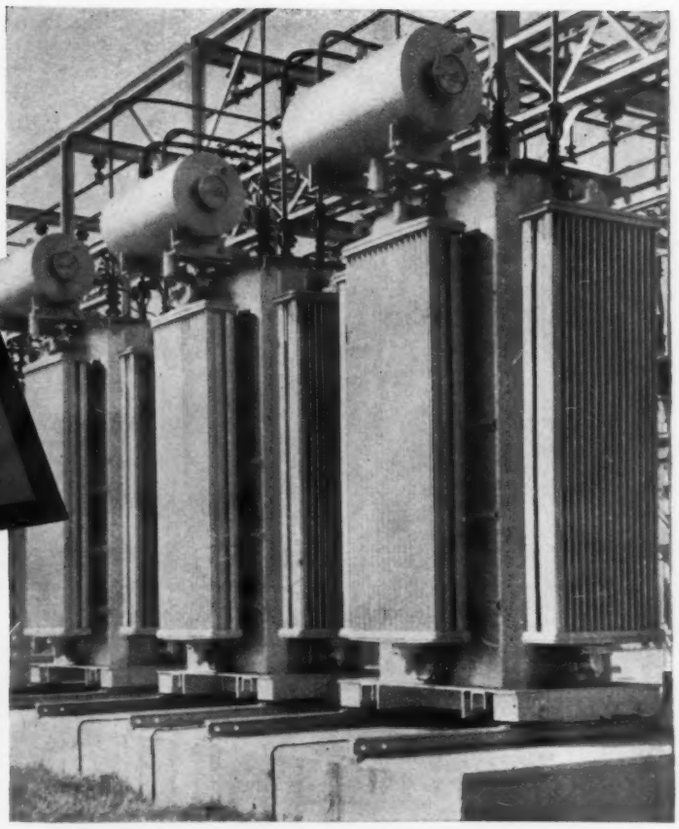

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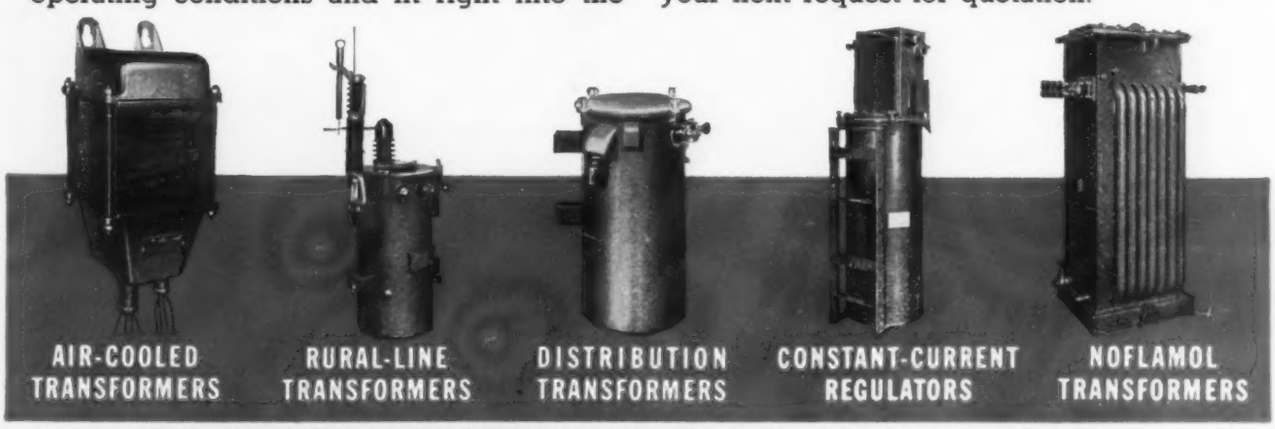
Power and lighting service without interruption is of vital importance if we are to produce the enormous quantities of material and equipment needed to win this war.

The power industry must "carry the load" and be ever ready to serve users with absolute dependability.

Transformers are the essential links in power distribution and they must be able "to take it" – they must be able to stand up under the heavy loads imposed upon them by industry today in its "all-out" effort to "beat the promise."

Wagner transformers are built to give dependable performance under the most severe operating conditions and fit right into the needs of the power industry. Every Wagner transformer has the benefit of more than 50-years of transformer engineering experience... experience in building all types and sizes of transformers. No matter how varied your requirements, Wagner transformers will do the job. Specify Wagner transformers on your next request for quotation.



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FOR COMPLETE DESCRIPTIVE LITERATURE on the design and construction of Wagner transformers, write for Bulletins TU-180 (Distribution) and TU-181 (Power).

T42-9

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Bill feels at home

IN THE COCKPIT!

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Instruments for planes, ships, tanks, guns, radio — as well as for the industries producing these and other implements for a victorious war. This has been WESTON'S assignment from the earliest days of our defense effort! » » » But despite the vast increases in manufacturing schedules, WESTON'S design and manufacturing principles have remained unchanged. There remains the same firm insistence on the *quality standards* which are known as essential for accurate and dependable behavior of instruments in service. » » » Because *so much*, in this war, depends on the movement of tiny instrument pointers!

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Announcing

The IB-10 *A New Portable Watthour-meter Standard*

Has High- and Low-current Capacity, Combined with Light Weight

HERE'S a standard that combines, for the first time, the capacity essential to the testing of both low- and high-current-rated meters with the light weight and small size of the best low-capacity standards.

4 Ranges for Speedy Testing

Wide operating range and excellent testing flexibility have been obtained by the use of four current coils—1-, 5-, 12.5-, and 50-ampere. All coils will carry 200-per-cent current continuously so that service meters of all ratings up to 100 amperes can be tested.

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High accuracy is an important feature of this standard and is made possible by low-speed and high-torque characteristics. The element is so designed that variations in voltage, frequency, and wave form have negligible effect on the accuracy of the standard.

Calculator Makes Testing Easier

The new handy pocket calculator, which is supplied with each standard, makes possible an easier-to-teach meter-testing routine for new employees, because it eliminates complicated time consuming calculations to translate meter readings into accuracies.

Bulletin GEA-3614 describes the IB-10 in detail. Ask your G-E office for copies. Or write to General Electric, Schenectady, N. Y.

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3. Check the accuracy of the IB-10 by using a chronograph

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Striding along with Uncle Sam on his march to Victory are the Men of Thermador, zealously turning out products of war—helping to defend the homes they helped to build.

From the lessons of war will come even greater Thermador products of peace to bring warmth, comfort, convenience, and economy to the American home.

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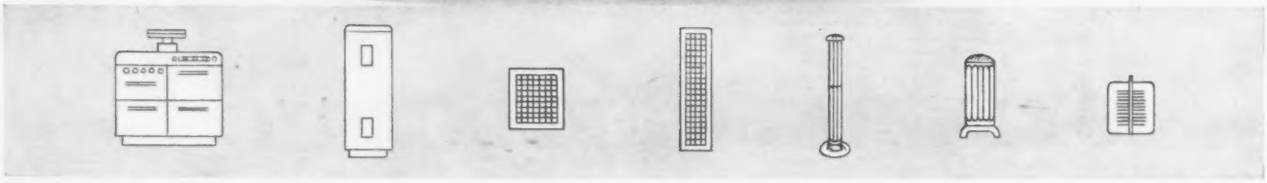
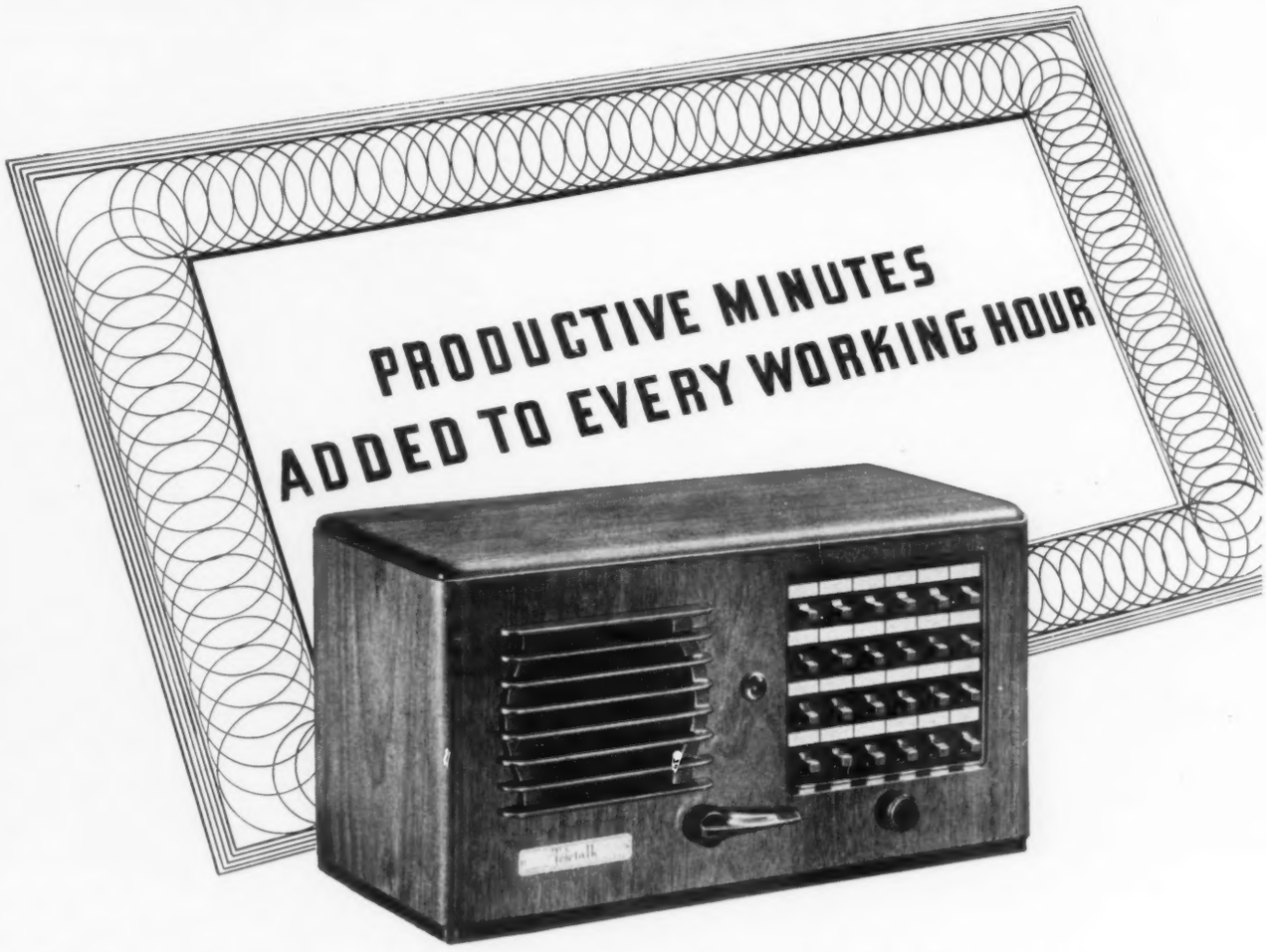


NOW... MORE THAN EVER... YOUR CUSTOMERS *NEED* THIS REGULAR TELETALK PREMIUM



Speed is the order of the day . . . time the most precious raw material of all. You can show your customers how to gain time with Teletalk, and make a three-way profit—from labor, materials, and Teletalk—in the bargain.

Saving time has always been the prime sales point with Teletalk, and demonstrating Teletalk has always been the most direct way of putting that sales point across. That's why we urge you to demonstrate Teletalk now. You do business every day with people who are producing for war or essential civilian needs. The complete Teletalk line of models and special features enables you to satisfy the intercommunication requirements of the people who make up your market, whether their businesses are large or small.

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They'll be glad to learn, too, of the quick installation, low operating cost, and quality for long years of service that are part of the Teletalk story. If you are not already familiar with Teletalk Amplified Intercommunication, the nearest Teletalk distributor can give you the information you need . . . or write direct.

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WEBSTER ELECTRIC

"Where Quality is a Responsibility and Fair Dealing an Obligation"

ELECTRA'S HUSBAND

Inflation and Social Reform

WHEN Electra starts muttering to herself and then begins pushing papers around on the top of her desk, it's just as though the black and red hurricane warning was flying from the pole atop the Telephone Building. This particular evening the storm was not long in breaking.

"I just can't do it," she said with an air of finality. "It's either up to you or to Leon Henderson and the OPA. I get more money in the household budget or you begin living off some of that fat you've accumulated around your waistline. That or Mr. Henderson and his henchmen put some ceilings which *are* ceilings on groceries. We ate $26 worth of food last week. And you can cut roast beef off your diet. The little morsel you carved up when the Smiths were here to dinner Saturday night cost just exactly $5.45. . . ."

"Jeepers creepers, you must have bought an interest in a cow!" I interjected. "That or the butcher shop."

"Don't try to evade the issue." she fumed. "What am I going to do for money to run this house? The gal who does the laundry says she's quitting unless she gets ten cents an hour more. The boy you got to cut and water the lawn for $2 a week has gone to work in the shipyards as some kind of a helper for 90 cents an hour. And the three pairs of second rate stockings that I was able to get today cost $6.75. I paid $5 for a stamp for the car. If I write one more check the bank is going bust. You've simply got to increase my allowance."

"With what?" I asked. "You know what a tough haul it was last year to save enough to pay the income tax. Well this year it isn't going to be enough. We'll need twice that much. Tell me where we'll get that before you start asking for more."

"I don't know what's happening," she sighed.

"Well I do," I said. "It's inflation in your case. You see the spiral starts slowly at first and away we go. . . .

"Don't start any technical description of inflation. I read enough about it in the papers."

"There is a simple explanation. It's merely another way of saying that we have to pay for our social aims, gains and reforms."

"Such as?" she asked.

"Well job security, for instance, and farm subsidies and youth welfare. The whole gamut of social experimentation. You can include public power along with the rest. And if you want to get specific you needn't overlook such a thing as the amendments to the Bonneville bill. If you get hot about your household budget, just imagine how I feel about my business when I read things like this."

I tossed her a copy of the *Oregon Voter* in which the editor of that forthright little publication spoke his piece about the recent Congressional hearings on the Bonneville amendments. She read aloud:

" 'Private power companies of Washington and Oregon are substantially monopolies. The remedy is to give the power business into the hands of one gigantic monopoly—the US Government.

" 'Our investor-owned power companies are practically all run from Wall Street. The remedy is to create the Columbia Power Administration and send it to Wall Street for the millions required to finance its expansion into a single all-inclusive master power grid.

" 'The electric power business of Washington and Oregon is done mainly by some eight major companies, hence lacks integration. The remedy is to have the CPA take over and carve up all the facilities among 60 or 70 or more little PUDs and REAs.

" 'The big problem for Bonneville Power Administration is that of creating more energy to market. The remedy is to have CPA take over and retain the generating facilities of the investor-owned companies.

" 'The big long-term problem of Bonneville Power Administration and successor is that of marketing the power it generates. The remedy is to take over and retain the generating facilities of the investor-owned companies.

" 'The electrical power conditions and needs of the Pacific Northwest are quite different from those of any other sector of the United States. The remedy is to devise a unique and different setup and impose it upon the region from Washington, D. C.

" 'The Pacific Northwest has great resources and land areas, untapped because of remoteness from markets and lack of markets. The remedy is to place us under a mighty benevolent political power grid system directed by the Secretary of the Interior that, through his guidance and by means of federally subsidized energy, both new and present products may be produced more abundantly.' "

Electra's brows furrowed and she looked from book to me and back again.

"Why the people who propose anything like that must be screwy," she said.

"That's an unladylike expression," I commented. "They are inflationists."

FOR EIGHTEEN MONTHS now Electra and I have been watching with Western pride something which, for want of a better name, I have called the genesis of an industrial revolution. Now the national spotlight focuses attention in its import, points to a brilliant future.

Said *Newsweek* in its June 22 issue, "War Effort Forges West Coast Into a New Industrial Empire—Vast Production Under Way—Population Booms, and New Era Is in Sight When Peace Comes." Significant, the magazine said in conclusion, is that "the eleven Western states are finally getting the industries that can make them economically self-sufficient after the war. Equally important they are getting the population necessary to sustain an industrial economy by providing a market. . . . Prewar industries will unquestionably continue and expand. . . . It is probable, too, that Western industries will find great markets abroad."

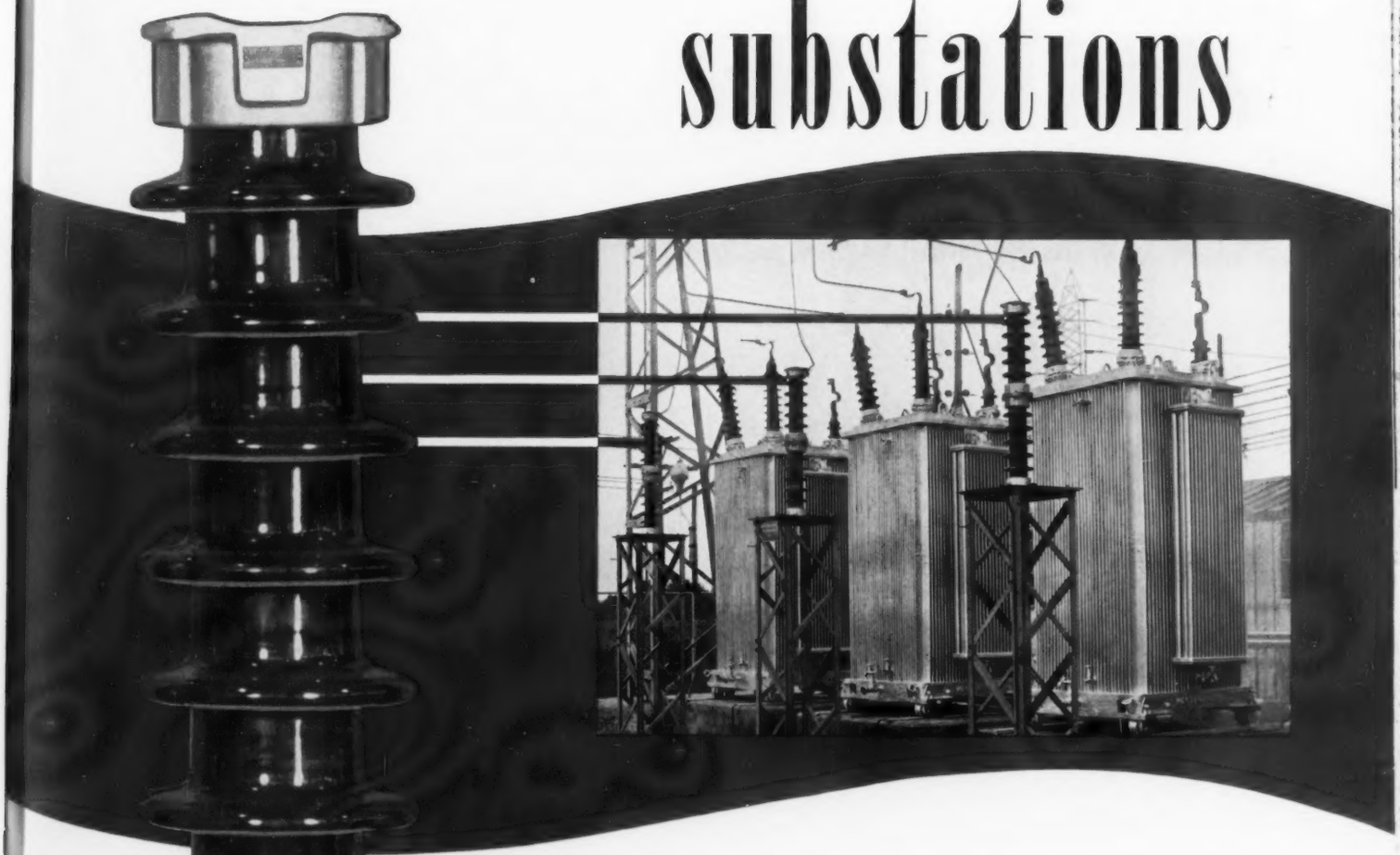
As though this were not sufficient, *Fortune* for July, in an eleven-page article, headlines this industrial revolution thusly: "The Westward Empire—Is the U S. West Coast to become a great industrial region and heart of a Pacific trade empire? The Coast thinks war has brought this destiny near." Steel, light metals and electric power, say the authors, are making the long-distant goal of Western self-sufficiency a reality. . . . "At a conservative estimate the war has speeded up the industrialization of this mining-lumbering-farming region by twenty years."

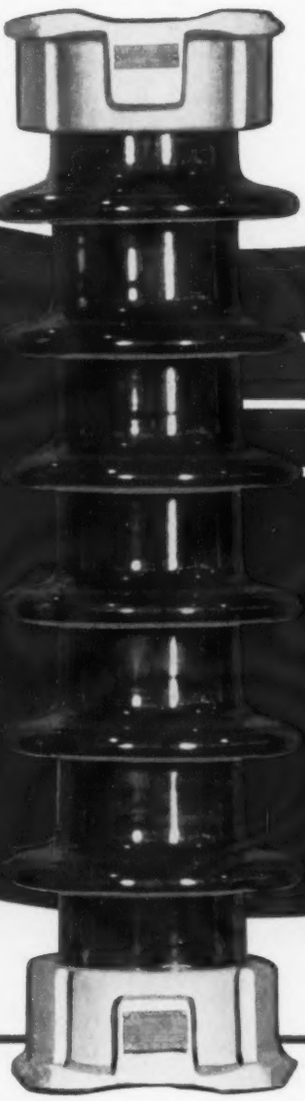
When we were talking about this again the other night, Electra had another pertinent comment:

"I wonder if all the boys in uniform are like the ones I give rides in our car. Almost every one of them says that this is the region for him when the war is over. 'I'm going to send for my gal,' they all say, 'and settle down here for good.' "

HERE'S AN ARRESTER MADE SPECIFICALLY

for small substations





LVS ARRESTERS HAVE

- High discharge capacity—for "hot" or "cold" lightning.
- Low protective ratio — 2½ times arrester rating.
- Solder-Sealing — to positively exclude moisture.
- Pre-ionizing buttons to assure consistent low breakdown of series gap.
- Platform base to permit mounting directly on transformer.
- Unit design for "building up" to higher ratings.

Now you can buy an arrester which can be economically used in 20 to 73 kv substations where the more expensive station type arrester is not justified. Westinghouse LVS arresters are of UNIT design for platform mounting, easily installed directly on transformers, crossarm brackets or substation structures. Four Units are available, rated 20, 25, 30 and 37 kv, which can be placed one upon another for all ratings 20 to 73 kv.

Solder Seal, an exclusive Westinghouse-developed process, provides permanent hermetic bonds between porcelain and metal. Moisture is positively excluded.

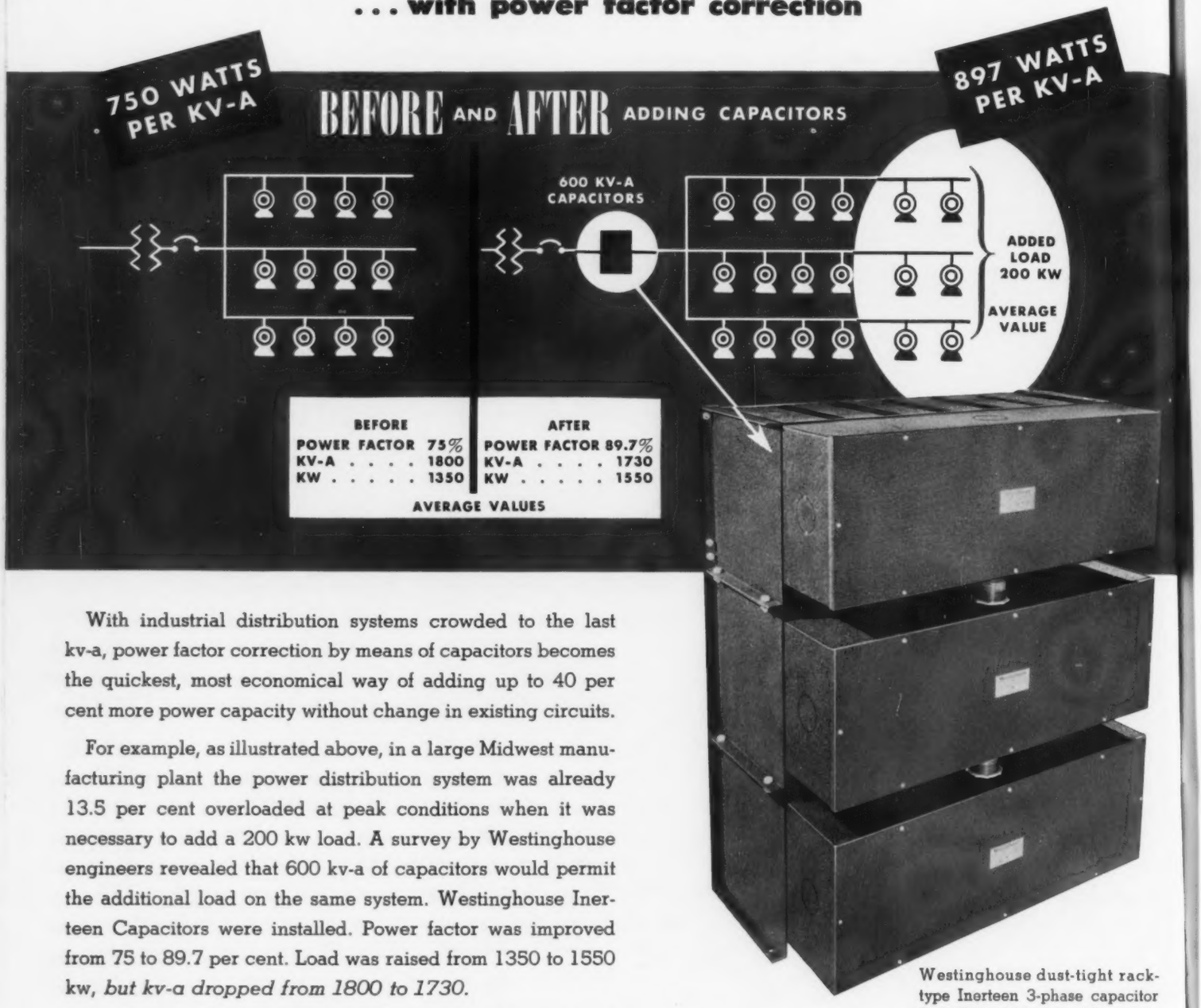
These arresters are further evidence of how Westinghouse equipment helps keep power flowing to meet today's emergency loads. For complete information call your Westinghouse Office or write for Descriptive Data 38-130. Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., Dept. 7-N.

J-60506

Westinghouse

HOW TO GET more motor power PER KV-A

. . . with power factor correction



With industrial distribution systems crowded to the last kv-a, power factor correction by means of capacitors becomes the quickest, most economical way of adding up to 40 per cent more power capacity without change in existing circuits.

For example, as illustrated above, in a large Midwest manufacturing plant the power distribution system was already 13.5 per cent overloaded at peak conditions when it was necessary to add a 200 kw load. A survey by Westinghouse engineers revealed that 600 kv-a of capacitors would permit the additional load on the same system. Westinghouse Inerteen Capacitors were installed. Power factor was improved from 75 to 89.7 per cent. Load was raised from 1350 to 1550 kw, *but kv-a dropped from 1800 to 1730.*

Result: The *plant* saved extensive rewiring. The combined saving in demand charges and the larger power factor bonus from the power company paid for cost of capacitors within a year. The *power company* gained a 200-kw pay load while 70 kv-a of its generating capacity was released for other demands.

For full information, call your Westinghouse office. Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., Dept. 7-N.

J-60508

Westinghouse dust-tight rack-type Inerteen 3-phase capacitor for indoor industrial applications.

HERE'S WHAT YOU GET:

1. **Dust-tight Ventilated Assembly**—Keeps unit clean and cool.
2. **Compact Design**—Saves floor space.
3. **Full Accessibility**—For inspection of terminals and fuses.
4. **Flexible Design**—Easy to add capacity.
5. **Complete Factory Assembly**—For fast, low-cost installation.
6. **Solder Sealed**—Prevents contamination.
7. **Inertex Paper**—Specially developed for capacitor service.
8. **Inerteen-filled**—No insurance hazards.

Westinghouse

ELECTRICAL WEST

AUGUST, 1942
VOL. 89 NO. 2

Public Relations of Private Enterprise

Employee training in personal service vital factor in deciding ownership question; present no time for utilities to adopt "hard-boiled" attitude

By Alfred M. Cooper

WE ARE told that today private enterprise all over the world is in jeopardy. If this be true, then surely now is the time for the management of any corporation to inspect with utmost care its public relations. In a utility company, management was once primarily concerned with the attitude of the public chiefly because this attitude affected its business with a relatively small group of consumers. Now the public relations of fifty American utility corporations may well be a powerful factor in deciding the fate of all private initiative, everywhere.

Those of us who have learned from the inside all the good and bad features of private and public administration of electric utilities would not like to see government acquisition of any considerable portion of industry become an established fact. Therefore we welcome the news that not only have the utility corporations, but all steel, automotive, transportation, and manufacturing industries acted splendidly to meet the challenge of war production on an unprecedented scale. It is most important that the average American citizen be made fully aware of the fact that this war is being won by our side primarily because American private enterprise has no equal in the world as a force for getting things done.

It is in terms of just such effective and dramatic effort on the part of great concentrations of intelligently directed private capital that our citizens will shortly make their choice between national socialism and the preservation of free enterprise. The war effort of the privately owned utility company, measured by its willingness to cooperate in time of great emergency with an administration that has in the past decade cooperated but little with the private utility, also will be remembered and evaluated by a sobered postwar populace.

At such a critical moment as this it is important that nothing be overlooked which will add to favorable public opinion. As one example of this there is the intelligent nationwide advertising campaign, sponsored by 60-odd electric companies, which is educating the public to the part American business management is playing in furnishing power to our war industries. It is high time that private enterprise took steps such as these to refute the glib prattle of those who would so dearly love to tinker with our democratic way of life.

Publicity (magazine, newspaper, radio, stuffer, and even billboard broadsides) is good, and should be used increasingly by all private enterprise. And the physical service rendered by the electric company when it furnishes continuous and adequate power for all war needs—this factor also ranks close to the top as a molder of public opinion. Rates are important, too, as are the appearance of a company's buildings, and its equipment. In general, all of these factors influencing public attitude have been considered by the utility company's management and there is, as a rule, little found wanting here.

But there is one factor which goes almost as far toward molding public attitude as does physical service, and which is much more influential in this direction than is publicity; yet in too many utilities this element of public relations has never been developed to its fullest extent. I refer, of course, to the personal service rendered by every employee of the company who comes in contact with the public.

Here, in the development of superior employee performance, is the one great opportunity of the private utility corporation. In physical service, in rates, in use of the common media of publicity, the publicly owned utility can compete successfully with the privately owned utility. But when it comes to training personnel to give consistently friendly, courteous and helpful service the privately owned concern has the edge.

Much of this advantage springs from the fact that it is fairly easy to show the employee of a private firm the correlation between a disgruntled customer and diminishing cash register receipts for his employer, with the tie-in to his own future. The institution of civil service, by its very nature, is an obstacle to effective employee training in public relations, no matter how earnest the attempt.

Further, the majority of men and women in business are pretty much convinced that a show down is coming after this war on the whole question of private versus public ownership. If they are working now under the private enterprise system, it is reasonable to assume that they prefer that system and will try to preserve it.

Most privately owned electric utilities have, at one time or another, instituted training in public contacting among their contact employees. Oftentimes this training has taken the form of series of conferences in which problems of contacting technique are discussed, and methods of improving personal service agreed upon. Wherever such training has been properly conducted, inevitably there has occurred a definite improvement, not only in employee service and in public relations, but in employee morale as well. Also, it has been repeatedly demonstrated that public relations training, to be effective, must be constantly in force. There is no such thing as a completed program of public relations training.

There are but two weak spots in the work that has been done in many utility companies in training employees in public contacting. The first of these lies in the failure of these companies to continue to place emphasis on such training in time of war. Just because the people of the country are upset and thrown off their natural stride by war conditions, there has been a tendency to consider that the amenities in consumer relationships can be dispensed with for the duration.

The natural hard-boiledness of a people engaged in prosecuting a great war has apparently transmitted itself to many employee-consumer contacts. At this critical moment in the history of private enterprise it would appear to be extremely shortsighted to permit anything to happen that would create antagonism toward private ownership of electric utilities. In other words, now above all times is the proper moment to emphasize public relations training in the privately owned electric utility. After this war is over may be just a few months too late.

The second weak spot in public relations training in the average private utility has to do with the *extent* to which such training has been given in that utility. Ordinarily public contact training is given to public contact employees—meter readers, adjusters, collectors, telephone operators, and so on —and under ordinary circumstances these people might be the only ones in need of such training.

But these are not ordinary times. And whether we realize it or not, every employee in our company is really a public contact employee at some time or other. Hardly a day passes but that the lineman or machinist, for example, is not asked some question about his company by a friend or acquaintance. Most of these contacts are made outside of working hours. And much more in public relations may depend on this employee's reply to such queries than upon the studied response of a carefully trained order clerk in contacting a consumer in the commercial office of that utility.

In a publicly owned electric utility I have repeatedly put on short intensive courses of training for every employee in the entire organization at times when only a bond issue of a few million dollars was at stake. If the municipal power bureau can afford to take such steps to insure victory in a bond election, how much more important is it that the privately owned electric utility overlook nothing that will improve its position at such a time as this.

Training of the sort to which I refer can be installed in such a manner as not to be burdensome. It is necessary only that the individual employee attend one training conference each month. At these meetings he is trained, through discussion, to give replies to those questions put to him by his friends — intelligent replies that will give the citizen a completely favorable impression of the company that employs him. These replies are, of course, not parrot-like mouthings, but considered responses based on the employee's complete knowledge of the matter embraced in the citizen's question. It is not difficult to plan and execute a series of such training conferences. When these are properly conducted it means the end of those situations in which the employee gives out false and damaging information about his company simply because he does not know any better.

It must be understood that informational training such as that to which I have here referred has little resemblance to the training in company organization and history which is sometimes given generally to all employees of any corporation. In public contact training the employee is not only taught the history, organization, and service ideals of his company, but also is taught how to disseminate this information for his own and the company's good. Five thousand militant employees thus trained are a powerful public influence in any community. A half million or so of loyal and well-informed utility employees scattered throughout the country may make all the difference in the years ahead.

Not all unfavorable public attitude is caused by poor personal service on the part of the employee. In every utility corporation with which I have come in contact there are in effect certain practices which react against the best interests of the company. As often as not these practices take the form of policies created in the commercial office and which have for their objective the essential collection of money for services rendered. In one case a shut-off notice is sent out too closely on the heels of the bill; in another instance it is the wording of such a notice; again, it may be the language employed by a field or office collector in endeavoring to make a collection.

Or, if salesmen are employed by the company, there may have been in the past a shade too much persuasion applied in attempting to close a sale. We are all familiar with this latter irritant in our contacts with the gentle high-pressuring to which we used to be subjected in certain chain drugstores and filling stations. We never liked it. Our own customers don't like it. Right now that is much more important to us than taking in a few extra dollars in revenue. If there are routines such as these in effect in any privately owned electric utility today they should be abolished at once, while there is yet time to overcome their ill effects on public attitude.

It is difficult to generalize in matters like these in terms of an entire industry. But within any particular company it is easy to spot quickly those small irritants which create more public ill-will than would an actual raise in rates. When management realizes the damage these routines are causing, it is not difficult to find and eliminate such trouble-making practices. The only difficulty ordinarily encountered consists of the fight which some executive may put up for a pet idea of his that perhaps helps him to make a better administrative showing, but that also makes altogether too many enemies for the company.

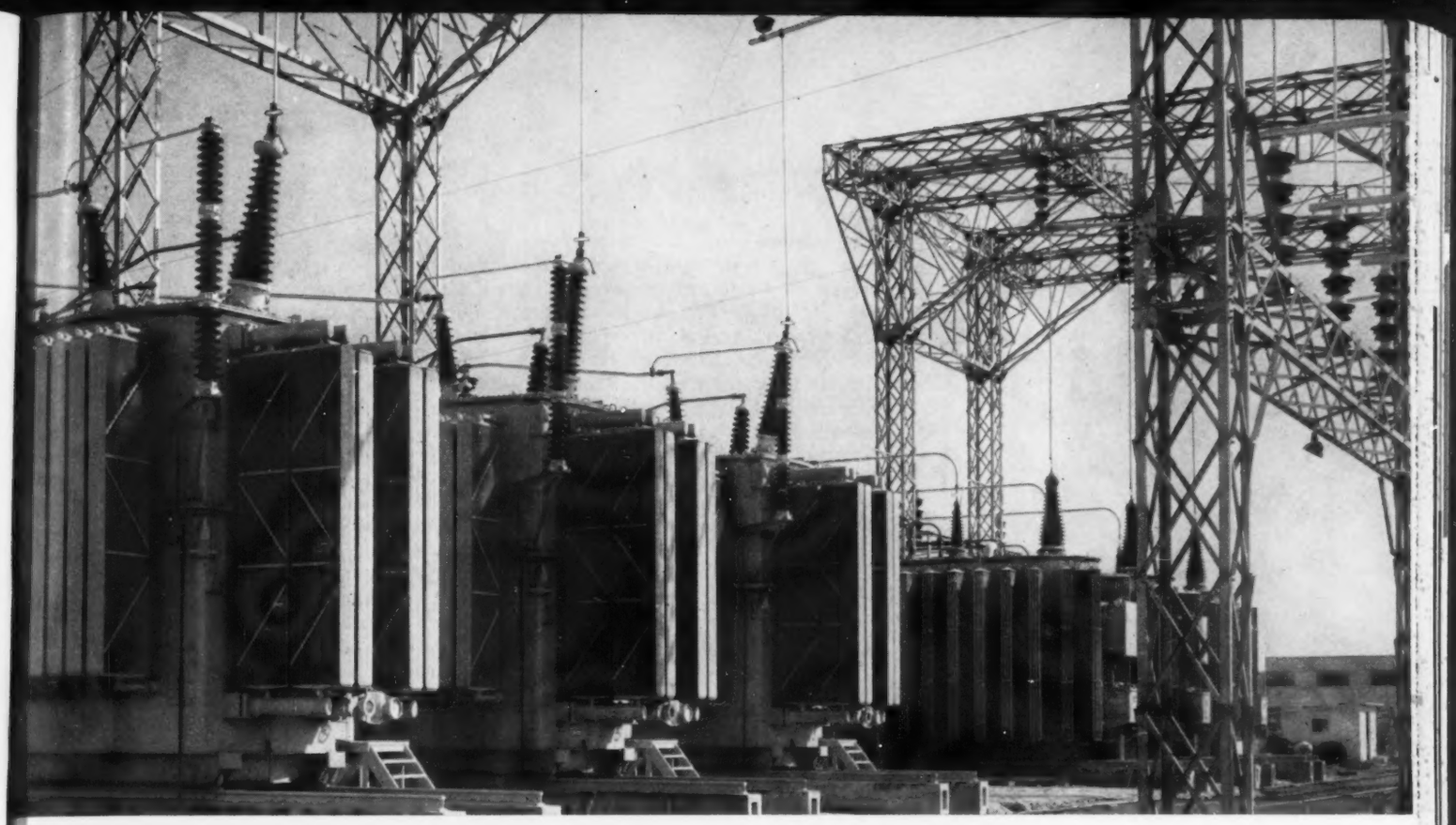
In the final analysis, however, the settlement of the ownership question will be determined largely on a basis of employee performance, and as I have said, it is here that the privately owned concern has a great advantage. There exists, right now, an excellent opportunity for developing the employees of the privately owned utility to a point at which the marked difference in personal service rendered under the two types of ownership cannot help but impress the most careless citizen. Eventually, of course, the wishes of this citizen must decide the ownership question.

Survey Points Need

No more convincing reason for continued effort in public relations and advertising, even during an all-out emergency, is needed than the result of a survey conducted recently among customers of a number of utilities and reported by Ashton B. Collins, father of Reddy Kilowatt:

"More than 40% of the people interviewed think the 'light company' does not pay enough local taxes, or pays none, or do not know. Half of the public does not realize that taxes paid by business help to reduce their own taxes. One customer in six does not know the name of the 'light company' at all, and 49.3% could not properly identify the name.

"The public is inclined to be three times as suspicious of a large business as of a small one; 72% thought a large firm least likely to give customers a square deal, and twice as suspicious of a corporation as of a company; (33% a company, 66.7% a corporation). Over half think it is 'hard to tell' or 'impossible to tell' whether electric bills are correct. Half the public thinks 'the light rates are too high'."



J. D. Ross Substation Is Northwest's Largest

Station, which now handles 266,000 kw., incorporates double-bus design, wrought iron welded buses and standardized steel structures—Three-cycle breakers used in line positions for maximum stability improvement

By Donald G. Worth
Design Section, Bonneville Power Administration

THE LARGEST power substation in the Pacific Northwest, from the standpoint of load handled, area served, and capital invested, is in its fourth year of construction by the Bonneville Power Administration. This federal agency was created by legislation approved by Congress on August 20, 1937, for the distribution of Columbia River power. To meet this requirement, a high voltage system has been constructed to transmit to present and potential load areas the electric energy generated at Bonneville dam, Grand Coulee dam and other government projects.

The basic system was designed to permit future expansion as needed, for transmitting the potential 10,000,000 kw. which can be generated on the Columbia River. This system consists of a 594-mi., 230-kv. ring, to which energy is supplied by generating plants. Connected to the ring at various points are major substations, which in turn supply energy to lower voltage loops and radial lines serving specific load areas.

The load areas directly served by the generating plants and the major substations in the present stage of the system development are as follows:

Bonneville Power House — Northern Oregon, and South Central Washington.

Grand Coulee Power House—Northeastern Washington.

J. D. Ross Substation—Western Oregon and Vancouver, Washington area.

Chehalis Substation — Southwestern Washington.

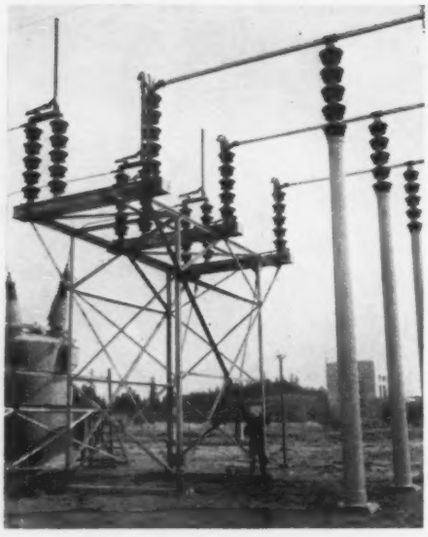
Covington Substation—Northwestern Washington.

Midway Substation — Southeastern Washington and Northeastern Oregon.

Largest of the stations and the dispatching point of the system is the J. D. Ross substation. Formerly known as the North Vancouver substation it was dedicated on September 5, 1941 by Secretary of the Interior Harold L. Ickes to the memory of James D. Ross, first Bonneville administrator, in recognition of his personal sacrifices and the immeasurable human value of his work. Since its beginning in August 1938, the government has invested $6,103,000 in equipment and buildings. This substation was first placed in service on April 28, 1940 and the demand has required year by year expansion so that work has never stopped. In its present stage of development it has supplied up to 266,000 kw. to war industries in the Portland, Ore., and Vancouver, Wash., areas, and to loads in the Willamette valley and in coastal regions of Oregon.

This central point is connected with the Bonneville power house to the east by two 230-kv. lines and with the Chehalis substation to the north by one 230-kv. line. The remaining portion of the 230-kv. ring extends northward from Chehalis to Covington, eastward to Grand Coulee, and then back to Bonneville. This ring is complete ex-

Forced air-cooling is being installed on the three 75,000-kva. main transformer banks (top of page) to increase their capacity to 100,000-kva. Three-winding single-phase transformers at the substation are rated 230/115-13.2 kv.



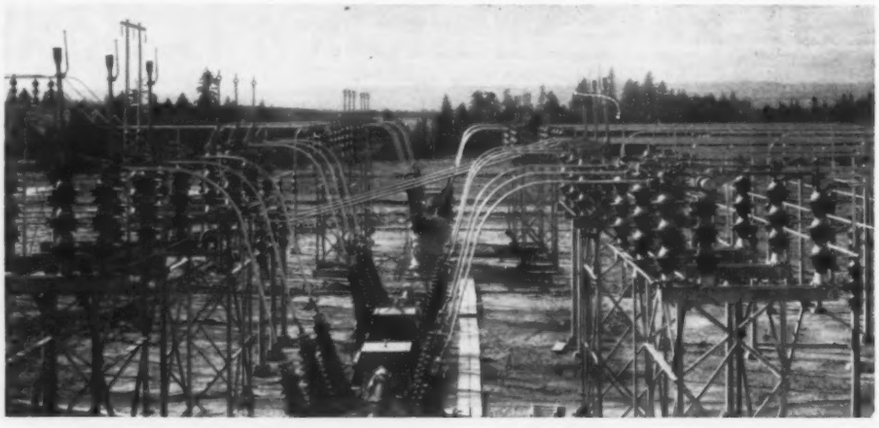
The 230-kv. disconnect switches are of the single-break, single-throw, group-operated rotating insulator type. This view shows the pedestal bus construction and the continuous wrought iron welded bus. Absence of bus fittings results in a streamlined appearance

cept for the Covington-Grand Coulee section, construction of which is nearing completion. A third 230-kv. line from the J. D. Ross substation to Bonneville will soon be under construction, and the erection of a second line from Bonneville to Grand Coulee is under way.

At the J. D. Ross substation, three 75,000-kva., three-winding transformer banks reduce the voltage to 115 kv. and 13.2 kv., and a fourth bank is on order. The capacities of the banks are being increased to 100,000 kva. by the installation of cooling fans. A 35,000-kva., 13.8-kv. synchronous condenser has been installed for voltage regulation and power factor correction, and orders have been placed for two other similar condensers. The substation also maintains a large warehouse, shop, laboratory, and office facilities for general use of the system. Supplying consumers in outlying points in western Oregon, in the Portland area and in the vicinity of Vancouver, Wash., are seven 115-kv. lines radiating directly from this substation. A double circuit 115-kv. line connecting directly with Bonneville is also under construction.

Provision has been made for connecting each 230-kv. line and each 230-kv. transformer to a double bus through two oil circuit breakers. Early operations were made with a single breaker for each line and transformer but plans are now under way for the complete double bus installation. Three-cycle breakers are used in line positions for stability improvement, while eight-cycle breakers provide adequate and less costly switching in the transformer positions, where trouble is less likely to occur.

Specifications for the three-cycle breakers permit the use of either the tank type or the porcelain-housed type breaker. All of the three-cycle breakers furnished thus far for this substation are of the porcelain-housed type, and eight-cycle breakers are all of the tank type. Each tank type breaker is provided with twelve multi-ratio bushing current transformers and three bushing potential devices. Three of the current transformers are for metering, three are for bus differential relaying, three are for transformer differential relaying and three are spares. To insure correct relaying, the current transformers are required to have an accuracy of 98% at from one to twenty times normal current. The potential devices are used for synchronizing and relaying. Each porcelain-housed breaker is furnished with six multi-ratio wound-type current transformers, each having twice the capacity of the tank type breaker current transformers. As potential devices are not supplied with porcelain-housed breakers, a potential source is obtained from potential devices on coupling capacitors.



Design of the J. D. Ross station aims at standardization plus utilization of a minimum of structural steel and a maximum of land. This view of the 115-kv. switchyard shows how well this is accomplished

The 230-kv. transmission lines are dead-ended to steel towers. The circuits are then carried down to 4-in., iron-pipe-size wrought iron buses with welded connections, mounted on 28-ft. tubular steel pedestals. The buses extend horizontally to disconnecting switches mounted on individual structural steel supports, thence to the oil circuit breakers and through other disconnecting switches to the main buses. The latter are mounted 16 ft. above the ground, a distance affording a 12-ft. vertical clearance below the connecting buses. A phase clearance of 12 ft. is maintained for the buses, disconnecting switches and oil circuit breakers.

A number of noteworthy features have been incorporated in the buswork at the J. D. Ross substation. One of the most important of these is that the entire bus arrangement utilizes a minimum of structural steel and a maximum of land. As land cost is low at this substation, the possible saving in steel has thus been a governing factor in the design. The arrangement also permits the addition of lines and transformers with a minimum of shut-down and change-over expense. Standard steel structures also are easily adapted to this type of construction. These structures are not merely standardized for this substation, but are also used at the various other substations on the Bonneville system. Obviously, such standardization results in lowered design, fabricating, erection and maintenance costs.

Various metals including copper, aluminum, alloy-steel and wrought iron were all considered for use as 230-kv. bus materials. Wrought iron was selected as having the most desirable combination of strength, conductivity and corrosion resisting properties. The choice of wrought iron provides one further advantage, in that it facilitates the use of welded connections. The absence of bus fittings simplifies construction and streamlines the appearance of the buswork. Furthermore, all bending and most of the welding is done in the shop, which greatly facilitates erection.

The 230-kv. and the 115-kv. disconnecting switches are of the single-break, single-throw, horizontal-upright-mounted, three-pole, group-operated rotating-insulator construction. Specifications call for a contact pressure of 300 lb., to be applied after the vertical movement of the blade is completed. This is accomplished by either a twisting or lengthwise movement of the blade itself, or of rods within the blade. The cantilever load on any insulator,

when the switch is in operation, is limited to 25 lb. A grounding switch is provided on one disconnecting switch on each line. These switches are all mounted on standard structural steel supports, designed for ready interchangeability of complete switches of different manufacture.

The primary function of the J. D. Ross substation is transformation from 230-kv. to 115-kv., regulation of the latter voltage and power-factor correction. By a combination of synchronous condensers, transformer load-ratio-control on the 230-kv. windings, and no-load tap adjustments on the 115-kv. windings, it is possible to correct power-factor and regulate the voltage of the 230-kv. network, and at the same time regulate independently the 115-kv. network voltage. Station service feeders from the 13.2-kv. bus are provided with individual step-voltage regulators.

Three banks of three single-phase transformers have thus far been installed, and the contract has been awarded for a fourth bank. The ratings of the various windings of each of the single transformers is given in the following tabulation:

Winding	Self-Cooled	Forced Air-Cooled
220 kv.	25,000 kva.	33,333 kva.
115 kv.	25,000 kva.	33,333 kva.
13.2 kv.	9,000 kva.	12,000 kva.

As indicated above, the substation design provided for the addition of forced air-cooling equipment to the transformers whenever justified. This equipment has already been added to the first three banks and is being manufactured for the fourth bank. The 33% increase in capacity is provided by a 1½ to 7½% increase in the initial cost of the transformer which the fan installations represent. The self-cooled rating provides lower reactance and better efficiency for normal load requirements, while fan installations permit the use of the higher transformer rating for emergency capacity, and for rapidly growing or unforeseen loads. The cooling equipment consists of open-type fans mounted around the periphery of the transformers.

The 230-kv. winding has partially graded insulation with the tap-changing mechanism located at the neutral end. During later development of the substation and of the Bonneville system, the introduction of neutral impedances for limiting fault currents is planned.

Each transformer is equipped with a device for maintaining a layer of dry nitrogen above the oil. To prevent leakage of air into the transformers, the nitrogen is maintained at a pressure slightly greater than atmospheric by an adjustable automatic regulator, which is supplied by a standard storage cylinder conforming to federal specifications.

The 115-kv. and 230-kv. bushings of the transformers are specified to be either the condenser or the oil-filled type. Capacitance taps are installed on each bushing for future connection of potential devices. Further provision has been made for the addition of bushing current transformers. Individual station-type lightning arresters protect all transformer windings. The 115-kv. arresters are mounted on brackets on the sides of the transformer tanks, while the 230-kv. and 13.2-kv. arresters are installed on structural steel supports near the transformers. It is planned to back up the lightning arresters with rod gaps placed near the arresters. All apparatus bushings on the 230-kv. system are rated at 196 kv. To prevent flash-over of apparatus and bus insulators located at some distance from lightning arresters, it is planned to install coordinating gaps at points where lines enter the substation.

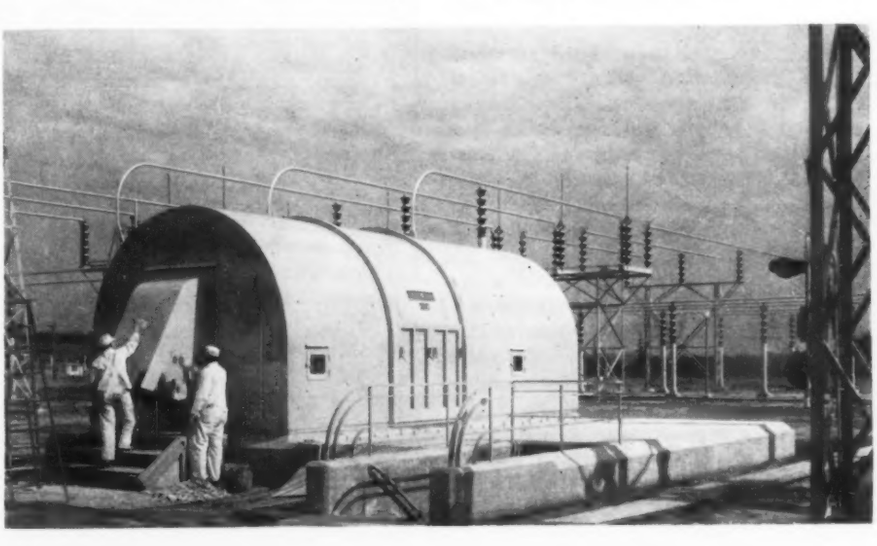
Equipment for handling the transformers consists of a system of rails, a transfer car and a 125-ton crane. Each transformer, mounted on a wheeled truck, can be moved from its foundation onto the transfer car. The transfer car is then moved into the untanking building where a crane of suitable capacity and sufficient height to untank the transformers is located.

The 115-kv. switching facilities are similar to the 230-kv. facilities, with a single breaker and bus tie arrangement used in the initial stages of the substation construction. Later development will utilize the full double bus construction. As the specifications for the oil circuit breakers permit solenoid, motor, or motor-spring operation, some of the breakers have been furnished with solenoids and others with motor-spring mechanisms.

Control cables are carried from the transformers, circuit breakers and synchronous condensers through underground concrete-enclosed fiber conduits to a reinforced-concrete control house. The cables are insulated with a special long-lived, low-moisture-absorbing rubber compound, suitable for use in moist locations. The cables are carried through troughs in the basement floor of the control house to sheet metal terminal cabinets. The main switchboard is situated on the ground floor directly above these terminal cabinets, and all wiring between the terminal cabinets and the switchboard is enclosed in sheet steel ducts. The main switchboard is of stretcher-levelled steel construction, with instruments and control switches mounted on the front panels, and with relays on the rear panels. Panels for the initial installation were furnished with instruments mounted but unwired. At present, blank panels are purchased and then fabricated in the shop where the instruments are mounted and wired to terminal strips. After being set up in the control house, the control cables are connected to the terminal strips to complete the installation.

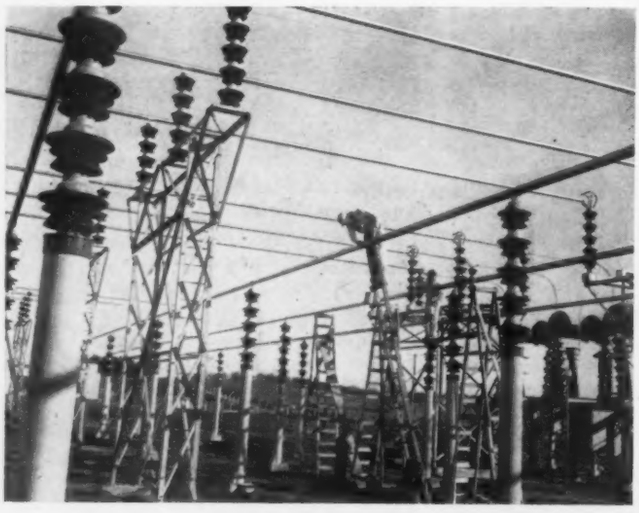
The transmission lines are protected against phase faults by high-speed impedance relays and against ground faults by directional ground relays. Provision has been made for the addition of carrier current relay equipment which is on order for the entire 230-kv. ring. Current-balance protection is given to two short parallel 115-kv. lines, while directional over-current relays protect four short 115-kv. lines serving a 165,000-kw. industrial load. Pilot-wire protection is planned for the latter group of lines.

One of three 35,000-kva. synchronous condensers for power factor correction has been installed. Transformer load ratio control on the 230-kv. windings and no-load tap adjustments on the 115-kv. windings facilitate the correction

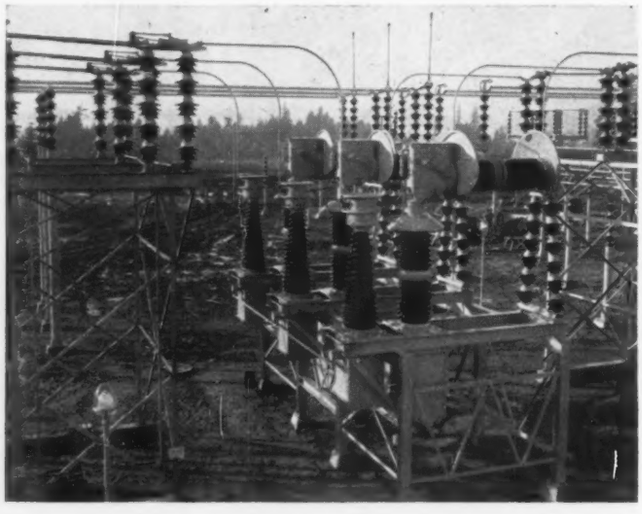


Induction-type differential relays protect the transformer banks, condensers, and the 230- and 115-kv. buses. Overlapping differential relaying protects the 13.2-kv. bus. The control for the oil circuit breakers is supplied by a 125/250-volt battery. The closing mechanisms are operated at 250 volts, and the tripping mechanisms and control circuits at 125 volts.

One synchronous condenser has already been installed at the J. D. Ross substation; the second and third condensers have been ordered and will be installed soon after delivery. These units are of the outdoor type with closed air-cooling systems. They are rated at 35,000 kva., 13.8 kv. and 720 rpm. Economic considerations dictated the choice of outdoor construction and air cooling.



Various metals were considered for the 230-kv. bus and wrought iron was finally selected because of its combination of conductivity, strength and corrosion-resisting properties. Connections could be welded, eliminating most bus fittings



Three-cycle breakers of the porcelain-housed type are used on the 230 kv. lines. Each is furnished with six multi-ratio wound-type current transformers. A potential source is obtained from potential devices on coupling capacitors

The condensers are started from 4,200-volt reduced capacity taps on the tertiary windings of the power transformers. The excitation system, consisting of automatic voltage regulators, with main and pilot exciters, has a specified speed of response of not less than one. The main exciter field is controlled by contactor-actuated resistance blocks when correcting large voltage changes, and by a motor-driven rheostat which operates during both large and small voltage changes. Hand-operated rheostats control the regulator and the pilot exciter. The setting of the regulator rheostat determines the voltage which the regulator will maintain. The pilot exciter rheostat permits the condenser to operate over its full range, making a condenser field rheostat unnecessary.

Cooling air is driven by the fan action of the rotor through vent ducts in the stator core to the enclosed space behind the stator frame. Passing from this space down through water-cooled air coolers in a pit under the condenser, the cooled air then divides into two currents, each of which circulates through an end-bell and returns to the rotor, from whence the cycle is repeated. The water for the air coolers is cooled in a spray pond having sufficient capacity for four condensers. Provision has been made for admitting unfiltered outside air through louvres for emergency operation.

Two bearings are used to support the condenser rotor, each bearing having an individual water-cooled lubricating system. When a condenser is to be started, the lubricant is pumped at a pressure sufficient to lift the rotor, thereby minimizing bearing friction.

Fire protection is provided by a high-pressure carbon-dioxide system for each condenser. An initial discharge of eight cylinders in one-half minute is followed by a delayed discharge of four cylinders over a period of three minutes. Action is initiated by thermostat switches which operate at 185° F.

Three types of communications are utilized by the Bonneville Power Administration: carrier telephone, land telephone and radio. The carrier telephone is the normal means of communicating with various points similarly equipped. Four carrier sets have been installed at the J. D. Ross substation and three others are contemplated for near future installation. The carrier communication channel will permit contact with some 30 other sets on the system, 12 of these already installed.

Land telephone lines are used for communicating with those points not having carrier sets. Quite extensive facilities have been installed at the J. D. Ross substation for this purpose, and to provide communications for the construction force headquarters there.

Radio transmitters and receivers at strategically located substations provide communications with vehicles in the field equipped with mobile units. Automatic selective calling of particular units is initiated by the operation of a telephone type dial. Units called while in motion merely stop, extend telescoping aerial installations and engage in two-way communications. Two channels are used for greater reliability. During emergencies, the radio sets provide an extra station-to-station channel between those stations having radio equipment, or to which mobile equipped vehicles have been dispatched. The radio station at the J. D. Ross substation was the first to be placed in operation. Since then, two more installations have been completed, while three other sets await installation.

Since its establishment in 1938, the J. D. Ross substation has grown rapidly, and further major additions amounting to nearly $2,000,000 are planned for the fiscal year 1942-1943. Included in these plans are a fourth transformer bank, the third and fourth synchronous condensers and extensions to the 115-kv. and 230-kv. buses.

Further growth of the substation will keep pace with the expanding electric generation on the Columbia River, until it fulfils the vision of J. D. Ross.

Radio Interference with C A A Systems

Airways communication radio networks present problems in keeping interference at a minimum

By J. M. Wissenbach

USE OF radio for communication and guidance in the aeronautical field has increased a hundredfold in recent years and with the declaration of war, radio has taken on additional importance in this field. We of the utility industry, by virtue of our past experience and knowledge, should endeavor to keep these communication systems as free from radio interference as it is within our power. It may mean the difference between life and death under some weather conditions.

Radio in this field is used most generally for two important purposes: the radio range beacons, and airways communication network systems. The radio range beacon is a homing compass which guides the pilot to his destination regardless of weather conditions. Radio range beacons are scattered over the entire country and are under control of the Civil Aeronautic Authority.

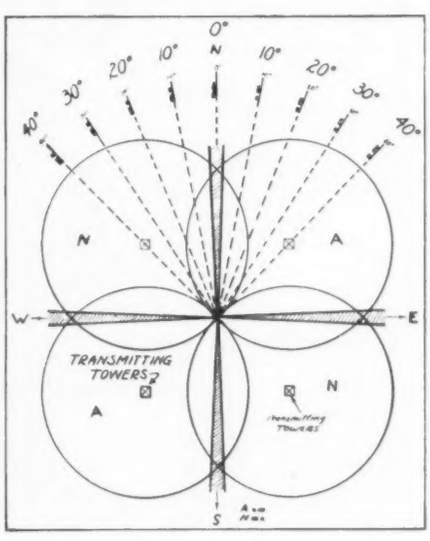
Briefly the range beacon transmitting station employs two directional antennas placed at right angles. This antenna system is made up of four 125-ft. steel insulated towers placed on the corners of a square and fed from the transmitter by buried transmission lines. Each directional antenna consists of two opposite towers on diagonal corners of the square. These are fed in opposite phase so that they give a radiation characteristic in the horizontal plane. To insure maintenance of the space pattern of the antennas, special stabilization features are incorporated in the transmission line circuits which serve to interlock the currents in the two towers of each directional antenna so that a change in phase or magnitude of the current in one tower is accompanied by an equivalent change in the other.

The principle of operation of the beacon is based on the fact that the intensities of the radio waves from the two antennas are equal through the horizontal and vertical sides of the square which bisects the angles between the two antennas. Elsewhere, one of the two waves is stronger than the other. An airplane may, therefore, follow a course along the bisectors referred to if means are provided for distinguishing the two sets of radio waves from one another. In the aural-type beacon two code letters are used; generally, an N (dash-dot) and an A (dot-dash). The two letters are so interlocked that when received with equal intensities they merge into a long dash along the line bisecting the two antennas. Off course to one side of these lines the "N" predominates while off course to the other side the "A" predominates. The interlocking signals are sent in groups of four with a short coded signal provided between successive groups for identifying the different beacon stations of the airways network. To facilitate use by the pilot, the beacon space pattern is oriented, whenever possible, so that the "A" signal lies in the northeast and southwest quadrants while the "N" signal lies in the southeast and northwest quadrants.

A Rocky Mountain Electric League Engineering report, prepared under direction of O. P. Reed, chairman

Radio interference affecting the range beacons under normal conditions would have to be at a very high level, but under normal conditions it is possible for the pilot to rely on ground objects for checking his course. It is under abnormal weather conditions that the beacon systems are indispensable, and at this time there is generally a large amount of snow or rain static which, when added to any interference from transmission lines, would blanket out the beacon signal. Transmission lines of 100 kv. and over are a potential source of interference to this service, and in general the field will extend above the line to a distance equal to the area covered on the ground. The Public Service Co. of Colorado to date has received no complaints of interference from this source.

Layout of CAA radio range beacon showing orientation of aural signals

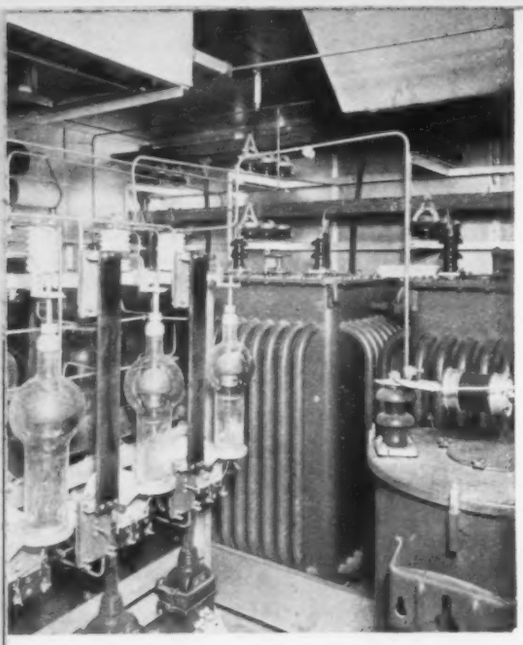


The airways communication network systems referred to consist of the Civil Aeronautic Authority and commercial air lines. If the radio interference level is high around the airport, these organizations will locate their receivers at some distant point and use remote control from the operating room at the airport. Thus any interference in or around the receiver position will result in complaints from these organizations.

We have received to date five complaints from this source, which involve the C.A.A., United Air Lines and Continental Air Lines. Three of these complaints were caused by small appliances at the airport and were corrected by the complaining parties, one was caused by a diathermy machine, and the fifth from a 6,900-volt distribution system. The diathermy machine was of a very old type and located some two miles from the airport. The location of this machine was turned over to the C.A.A. and they in turn requested the Federal Communications Commission to take steps to have this interference corrected. After the F.C.C. investigation, they reported the owner of this machine depended on it for a livelihood and it was unlawful to deprive a person of his means of livelihood. This ruling is important as many companies have a number of these machines on their systems.

The 6,900-volt distribution line causing considerable interference was a single-phase, common neutral line with the phase wire on ridge pins and the neutral on porcelain knobs about 4 ft. below. The specifications for this line called for grounding the neutral at every fourth pole to driven ground rod and for the suppression of radio interference, a bare wire was connected to the neutral and run to a point just above the bottom bolt of the ridge pins but not connected to them. This wire was anchored to the pole with iron staples. It was found a static discharge was taking place between this wire and the staples. When these wires were cut off at the neutral and removed the interference cleared up. This line was located one-half mile from the C.A.A. radio receiver location.

In order to make radio interference investigations on these communication systems a short wave radio is required as the night frequency is approximately 3,000 kilocycles and daytime frequency 5,000 kilocycles.



Short Wave Induction Heating

Electrical distortion and molecular friction are employed to dry plywood at 2,000,000 cycles per sec. in 600-kw. Albany, Oregon, installation

Part of the high frequency equipment employed in producing 600 kw. of 2,000,000-cycle current for the two presses is shown in this view. Transformers step up the normal 4,400-volt AC supply to 15 kv. It is then converted to DC through mercury rectifiers. Finally it is converted to 2,000,000-cycle frequency

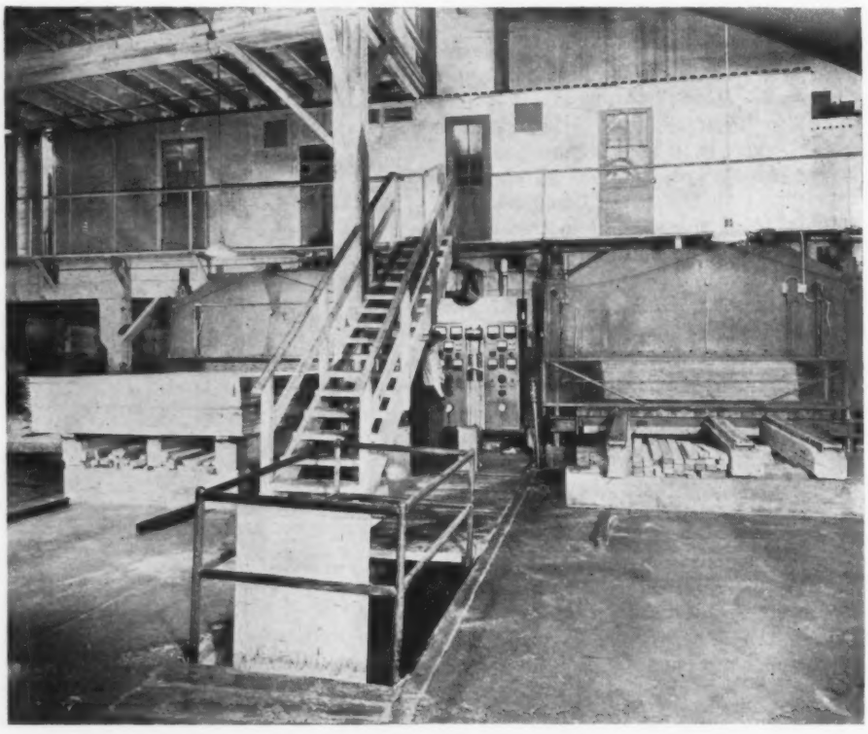
AT THE ALBANY, Oregon, plywood plant of the Albany Plylock Division of the M and M Wood Working Co., high frequency current is now being adapted to that stage of the manufacturing process known as the "setting" of the glue by means of which the wood sheets or plies are bonded together into panels. The application is one worked out largely by Paul D. Zottu, electrical and radio engineer affiliated with the Thermal Engineering Corp. of Richmond, Va. The M and M company, of which Michael Pasquier is chief engineer, observing the results of Zottu's experiments, engaged the Thermal Engineering Corp. to construct devices by means of which his principle could be applied to the manufacture of plywood on a commercial basis. The result is that two high frequency electrical presses are now in operation, the first of their kind.

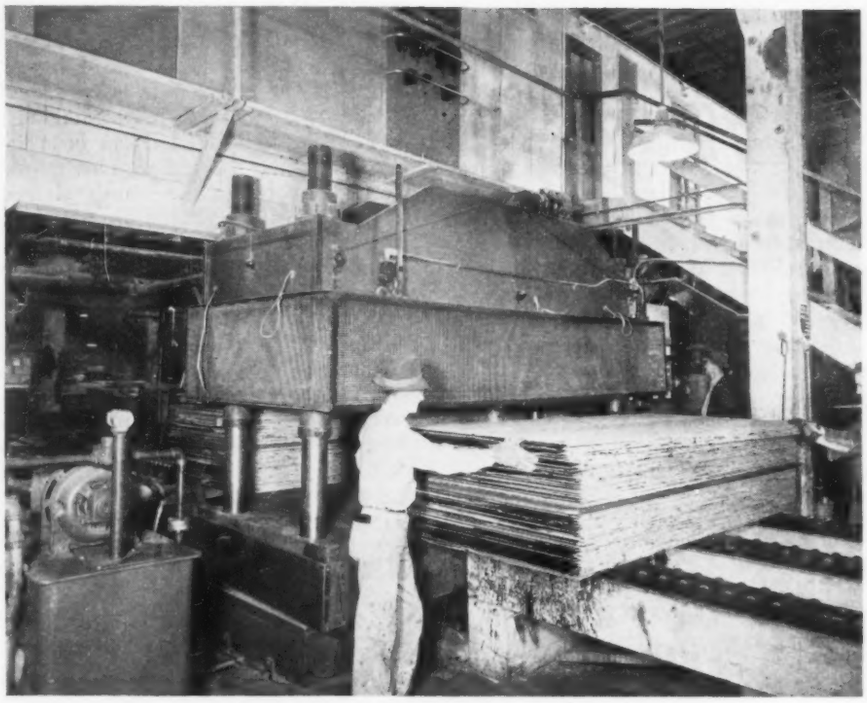
The principle employed is that of a condenser charged with high frequency oscillations of the order of approximately 2,000,000 cycles per second. The sheets of wood with wet glue between them constitute the dielectric. An ordinary condenser, when overloaded will pass current through the dielectric in the form of a puncturing spark, if the dielectric is an efficient one, or in the form of flowing current in the case of less efficient dielectrics. When accumulation of electricity is desired, inefficient dielectrics are of course not to be considered. But in this process the reverse is true. Here the dissemination of electrical energy through the dielectric is sought. As the high frequency current passes through the plywood bundle, molecular friction is set up, generating heat which hastens the setting of the glue. Hence, the moist plywood panels comprising the dielectric are highly efficient from the standpoint of the end desired, which is to heat and set the glue all through the interior of the panels which go into the press.

The two new-type presses in the Albany plant have electrodes 8 ft. long and 4 ft. wide, and 10 ft. by 4 ft, respectively. Instead of packing the panels in the press in stacks between flat top and bottom boards of wood, called "cauls," as in the usual cold press method, or between steam-heated metal plates as in the hot press method, in the high frequency press the method is as follows: On the bottom (negative) base of the press, panels are stacked to a depth of 9 in. Then a metal-plated caul board (positive electrode) is inserted, above which is another 9-in. stack, followed by the top plate of the press (negative). This arrangement will contain about 40 panels of average thickness. When the stack is in the press under pressure, the high frequency current is applied to the electrodes. The hydraulic press itself actually serves as the top and bottom electrodes.

Energy is supplied by the mill's steam power plant normally. The original wattage required is approximately 600 kw. divided evenly between the two presses. Conversion losses, however, reduce this to 400 kw. in the application. The original 4,400-volt alternating current is stepped up to 15,000 volts by transformers and then converted to direct current by means of mercury arc rectifiers. The direct current is then converted to radio frequency current at approximately 2,000,000 cycles,

These two high frequency electrically heated presses, the first of their kind in the plywood industry, are turning out plywood faster and better at the Albany Plylock plant. The control panel is located between the two presses. The transforming and rectifying equipment, the equivalent of a huge broadcasting station is located in the housing on the balcony which was designed to accomodate the 600 kw. of h-f electrical apparatus





The hydraulic press is charged with sheets of plywood in the center of which is a metal-plated caul board which serves as a positive electrode. Top and bottom of the press act as positive electrodes. Heating is caused by molecular friction induced by the 2,000,000-cycle current which causes distortion of molecules due to the very high electrical stresses

which is applied to the electrodes. It is the distortion of the dielectric's molecules under electrical stress at this high frequency that produces molecular friction, resulting in the necessary heat for the baking process.

To maintain a uniform flow of power as applied to the electrodes, a series of automatic controls is interposed whereby the capacity of the plywood bundle is balanced by that of the high frequency equipment. Temperatures required in the plywood bundle are between 160° and 180° F., but may reach as high as 300° depending upon the type of glue employed. The temperatures are, however, well under the maximum that the wood can stand without charring, surface checking or blistering by steam pockets.

There are a number of advantages in the high frequency process as contrasted with the two processes commonly employed, known as the hot press process and the cold press process. In the hot press process, live steam is usually applied to iron plates between which the panels are placed, and pressure applied. Necessarily, the area of wood in direct contact with the hot plates is heated first and most intensely. The inner plies of the panel, constituting the core, receive heat later and less of it. Therefore, the process results in less uniformity of heating, and a higher percentage of imperfect panels results than in the high frequency process which heats all parts of the mass simultaneously and uniformly.

In the cold press method, a stack of panels is put into the press to which no heat is applied. A series of bars and turnbuckles is then applied to the stack after pressing, holding the laminations tightly together, after which it is put away for the glue to set, usually an over-night process. It can be seen that a large number of cold presses are required and considerably more plant space for stacks, as contrasted with the high frequency process, which turns the panels out ready for finishing in a few minutes.

The thickness of the individual panels which can be economically heated in the conventional hot press is limited to about 1 in. The high frequency press can accommodate panels of 5, 6 or even 9 in. in thickness without requiring a longer pressing time. At the same time, narrower or shorter bundles can be pressed without appreciable loss of productive capacity, as the rate of heating is nearly in direct proportion to the volume of the plywood bundle being heated.

The total production of the Albany Plylock Corp. plant has been turned out through the high frequency presses since late 1941. They have thoroughly demonstrated their ability to perform on a rugged, 24-hour, daily basis, and the owners predict a bright future for this remarkable electrical application.

War Transformers

Conservation proposed by better cooling and eliminating spares

TRANSFORMERS are now vitally affected by the critical material situation caused by diversion of metals to war and armaments according to word from Washington. Priorities for new transformers are being rigidly limited to essential needs where all other means for getting the job done with existing equipment have been exhausted. Spare transformer equipment is out for the duration—even on direct war loads.

Full benefit must be obtained from overloading existing equipment through the use of additional cooling equipment before the WPB power branch will permit installation of new units. The staff of the power branch is following the recent recommendations of the NEMA transformer section on this point.

The NEMA recommendations, based upon maximum conservation of critical materials, propose that existing power transformer equipment can be more effectively utilized by (1) the addition of blower equipment or water spray to oil-immersed self-cooled transformers or (2) the addition of forced oil circulation to oil-immersed self-cooled or water-cooled units. In the latter instance, heat exchangers might be either air or water cooled.

NEMA's committee reports that blower equipment will add up to one-third to the rated output of a transformer, while water spray will add up to 60%. Forced oil circulation has been found to increase output as much as 66 2/3%. Amount of overload that can be secured on existing transformers by installation of this auxiliary equipment, the NEMA study reports, depends upon design and the present condition of the unit. It recommends that utilities or industrials check with manufacturers relative to individual applications before undertaking specific changes.

The instructions to the WPB power branch priorities staff also direct that utilities be required to install three-phase transformers instead of banks of single-phase units whenever this is possible. This applies to war loads as well as any others. A recent instance is cited where a rating was granted for a single three-phase transformer to carry the entire load into a new army camp after priorities for a bank of three or four single phase units had been turned down.

The NEMA group recommends that utilities avoid excessive spare capacity by utilizing existing spare single-phase transformers in new banks of three only

single-phase units and by using three-phase transformers for three-phase loads. An exception is in the case of pole-type transformers. Where this is done, the NEMA recommendations are that transformer stations be serviced by means of a mobile transformer substation.

Some notable installations utilizing spare single-phase units have been made by Pacific Coast utilities in recent months in providing quick service to war industries.

Touching upon the kva. rating, the NEMA committee recommends that the rating be based upon the standard 55° C. temperature rise, taking advantage of the average annual cooling medium temperature which is less than 30° and taking advantage of the many instances where the average loading is below the peak loading. For a given installation a transformer of 3% smaller kva. rating can be used for each 10% the daily average load factor is below 100%, down as far as 50%.

Bridge Behavior Recorded Electrically

Installation on Golden Gate structure permits observation under variety of atmospheric conditions

BEHAVIOR characteristics of the Golden Gate Bridge spanning the entrance to San Francisco Bay will be observed under a wide variety of wind and other atmospheric conditions by means of a recent installation of electrical measuring and recording instruments. Wind direction and velocity are measured and recorded over a 24-hour period and vertical and horizontal deflection can be quickly measured.

Two automatic electric wind instruments together with appurtenances have been installed on a galvanized steel supporting tower on the ocean side of the bridge at a point midway between the two 746-ft. main cable towers. The equipment clears the main 36½-in. cable and is removed sufficiently far from the bridge or any other obstruction that might interfere with proper functioning of the instruments.

The top portion of the mechanism is a 4-ft. all-metal vane with gilded directional letters mounted directly above an electrical wind generator enclosed in an all-metal weatherproof case provided with a mercury seal, and operates in series with the wind velocity transmitter on a 110-volt, 60-cycle single-phase circuit.

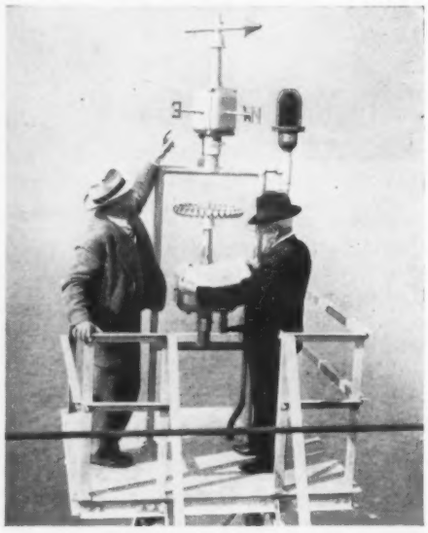
Directly beneath the wind directional transmitter is a multi-cap rotor connected with a wind velocity transmitter, which also has a self-synchronous generator, mercury seal and is enclosed in a compact all-metal weather-proof case. This instrument is calibrated for determining wind velocities of from 0 to 100 miles per hour.

Impulses from this installation are transmitted electrically to an automatic motor-driven recording unit located in the south main cable tower, some 2,100 ft. distant. Recordings of wind directions and velocity are taken at this point over a 24-hour per day period on specially designed charts.

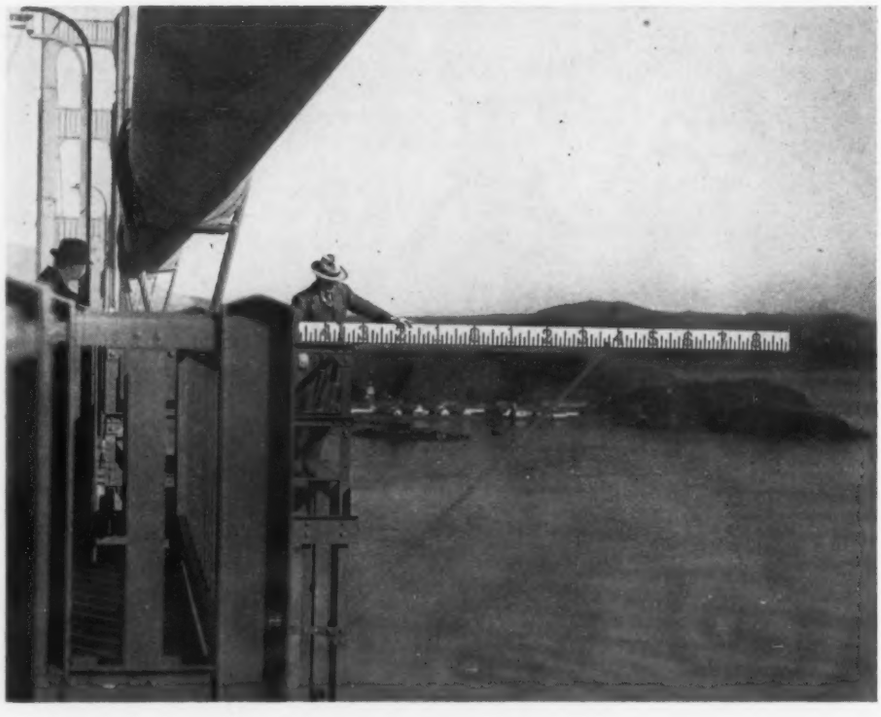
To determine horizontal and vertical deflections of the 4,200-ft. suspension span under storm stress, a rather ingenious method has been worked out by bridge engineers. Three small metal cups, numbered 1, 2, and 3, have been imbedded in the concrete sidewalk of the south tower adjacent to the automatic wind recording chart installation, while corresponding numbers have been placed on legs of a transit tripod. Thus whenever the transit is set up for use it is in a uniform position.

Sighting targets have been placed on the north tower, 4,200 ft. distant, and midway of the span, horizontal and vertical measuring rods have been installed. On the basis of a given atmospheric temperature the transit sighted on targets will register zero on both mid-span measuring rods.

Temperature recordings are also made at the south tower and mid-span, thus the south tower represents a centralized station for observation of all instruments at approximately the same time for structural deflection, temperature, wind direction, and wind velocity. The total time required for obtaining a complete recording of all instruments is about three minutes.



Electrically operated wind direction and velocity recorders shown at right. Below: This 17-ft. horizontal deflection measuring rod has been installed midway on the 4,200-ft. main span of the bridge. This rod operates in conjunction with a transit and sighting targets 4200 ft. away



Wired Help Pinch-hitting for Hired Help

Despite war handicaps, California dairymen are answering government appeal to boost production

"PUT electricity to work increasing food production" says a comprehensive booklet addressed to dairy farmers on the lines of the Pacific Gas and Electric Co. It then outlines the a-b-c's of equipping and operating a modern sanitary electric dairy farm, using data compiled from the PCEA Farm Electrification Handbook.

Quotas for milk and other essential food products have been established and the U. S. Department of Agriculture has called upon farmers to meet these quotas. The PG and E booklet presents factual information on how electrical equipment will assist the dairyman in making his contribution to the program. Supporting such data are pictures and testimonials from many successful dairy operators.

Indicative of the opportunities for electrical equipment are some of the examples cited in the foreword which points out that "as the situation stands at the time of this writing California dairymen have been asked to produce 223 million pounds of butterfat during the next twelve months. And notwithstanding the difficulties of the war, the unprecedented shortage of farm labor and the always slow business of adding new animals, the great majority of these dairymen are going ahead. . . .

"The exact steps being taken are, of course, a different story on each ranch, but we are safe in saying that electricity is a good part of the answer. All sorts of electrical labor-saving and time-saving devices which recently were only something to think about are now being earnestly re-examined, and wherever practical, put to use. This booklet describes the outstanding electric helps now being employed on our most successful dairy farms. While it was not originally planned as a war booklet, it contains a great deal of information which should be helpful to dairymen in meeting the present difficulties.

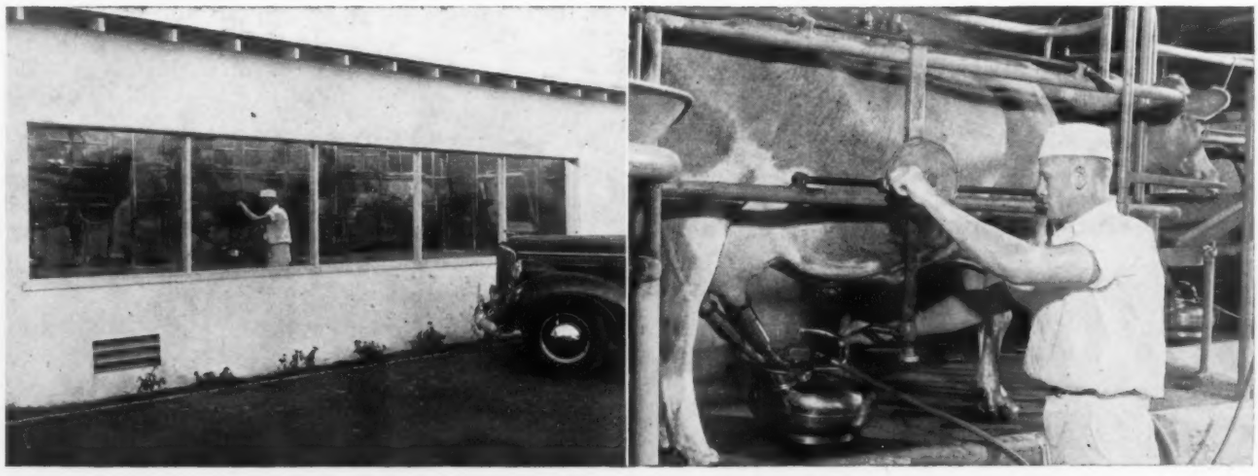
"The problem of obtaining feed, for example, may seem much less of a problem in light of the suggestion about manure tanks, or it may even be solved in the case of a dairyman using only dry pasture if he simply will adopt ordinary irrigation and grow at least a part of his feed at home. Incidentally, while the text doesn't mention it, we notice a great many wells which have been supplying only the house and barns are proving they can do this irrigating job too—sometimes with a larger pump, but frequently with no change at all. In the same connection we notice a number of dairymen using sprinkler irrigation as a means of getting a limited amount of water over a wide area economically.

"Aside from feed and water supply, the problems of increasing production require very little in the way of new, major equipment. The milking machine, cream separator, aerator, feed chopper and many other electric devices of this type are seldom worked to capacity, and welcome the emergency to show what they can do. Even the electric boiler can probably turn out enough extra steam to do the job, and if it should reach its limit (as might happen in the case of an automatic accumulator type) you can solve that problem easily with an inexpensive water heater.

"Such are a few of the ways that 'wired help' is taking the place of hired help and enabling the dairyman profitably to increase production."

Included among the installations cited is a 10-kw. electric dairy sterilizing unit which has been operating continuously for 13 years at a cost of approximately $7.50 per month. It has furnished sufficient hot water and steam to wash and sterilize 30 to 40 crates of bottles per day as well as all buckets, cans and other equipment. On another ranch an electric accumulator type sterilizer adjusted to full 100-lb. pressure takes care of the washing and sterilizing for 80 cows at an average operating cost of $9.18 per month.

On a 60-cow grade A dairy average operating cost for a sterilizer, milking machine, pump, milk cooler, refrigerator, a fine lighting system and a 10-hp. feed chopper is $22.46 monthly.



How electric milkers make possible increased sanitation, speed and public appeal is demonstrated at the Shady Grove Dairy near Pomona, Calif., where they are used in a modern Surge milking parlor, the latest in modern dairy practices. Three animals are milked simultaneously in individual stanchions, with the concrete floor raised to a convenient working height for the single operator. The floor is constantly hosed off, thus contributing to maximum sanitation. The milking parlor is in a separate room from the rest of the dairy, and is declared by its owners to be the ideal way to produce cleaner milk with greater speed and safety, and less work. Only two men are required to milk the dairy's 75 cows, bottle the milk and attend to its retail sale at the dairy—an advantage in these times

NAMES

What's In Herb Names?

It must be a spring—of enthusiasm, for he sees and siezes opportunity even in today's situation

THE sea-faring passenger who went down with the ship and, instead of drowning, came up with an oyster shell containing a pearl of great price was probably something like Herb Names, Denver, Colo., electrical merchandiser.

Herb regards the present crisis confronting electrical dealers as OPPORTUNITY, in box-car caps.

"Weak sisters and trade chisellers will be washed out," he asserts. "When the war is over we'll have a purged roster of substantial dealers. The part-time salesman whose principal vocation is barbering or conducting a laundry agency will no longer be with us; and the guy who used to tell his prospect, 'select a model at Herb Names' store and bring me the number. I'll get it for you at ten per cent under the list price,' will be doing something useful—I hope—in other fields. Nothing less than present conditions would provide the opportunity to blackout unethical practices. Another thing . . ."

Since he went into business for himself, Herb Names has wanted to emphasize service. However, he and his associates sold so many new units that the repair angle constituted only a minor phase of the business. Now he plans to double the service department—an OPPORTUNITY made possible by two almost simultaneous developments:

(1) Some of his best salesmen were drafted, or enlisted, into military service and (2) there was a sharp curtailment of merchandise-subject to sale.

"That works out just swell," says Names with great enthusiasm. "Three of my men go into Uncle Sam's service, so I'll put three men at work in my service department. Will people begin buying ice again when something goes haywire with their electric refrigerator? They will not. They'll want repairs. And that brings up something else . . ."

When the embargo on the manufacture of refrigerators, radios, washing machines, etc. is lifted after the duration, Herb insists, the public will be hungry for new appliances *if* they are constantly reminded of electricity's usefulness in the home. The current OPPORTUNITY is to safeguard established business by efficient servicing, so that the public will be primed for post-war buying of the same type of equipment that has served them well when complete replacement was impossible.

Names' optimism is infectious. When it became apparent that he must close his branch outlet in South Denver, he hung out a sign: "Moved to larger quarters." Floor space at the main store, 1532 Stout St., *is* more ample—and now much busier. "The trade" in Denver is chuckling over that one and feeling better about the entire situation.

Herb is chairman of the Rocky Mountain Electrical League's Retail Division. He is selling his committee, representing electrical dealers in Colorado, Wyoming and New Mexico, on a four-point program:

1. Maintain prices (don't get panicky and break the market by selling out at give-away prices).
2. Cooperate with each other in all trade matters (including morale, ideas and even lease-lending of stocks).
3. Guard business (don't promote business; just hold what you have).
4. Eliminate faulty practices (it's an opportunity, right now, to take inventory of trade practices and correct the bad ones).

Among the ideas Names uses in his own adjustment to a changed merchandising world is an old one he used to good advantage years ago when he was working for a music company. Memberships were sold to a large number of people owning radio sets, entitling them, for the membership fee of $2.50, to repair and service of their sets at any time during a year. Many never call for service, but consider the availability of it an insurance policy for which they are willing to pay. The income from this averages out well enough to take care of even the exceptional and infrequent big or complicated repair job.

Herb is going great guns with his service department. He now employs five men on service and two salesmen,

Arranged to permit salesmen to show appliances to prospects with least interruption or interference with each other, the main display room groups types for easy comparison

Glassed-in demonstration booth for Bendix washers permits both salesmen, inside and outside, to take advantage of the demonstration without interfering with each other's talk

just the opposite ratio to that which he operated when merchandise was plentiful. Names is attacking the service problem—which he finds no problem at all—with the same overwhelming enthusiasm that he used to sell new merchandise. His philosophy is:

"Service will keep the dealer in business, and the dealer's service will keep the customer's equipment doing business. It's a mutual aid affair."

So busy on service work is he that he would rather give free telephone guidance to the customer than send a truck on a minimum service call ($2.50). Classic example: A customer was told via telephone how to service his own refrigerator—by turning the vacuum cleaner on the condenser and applying a little oil. It worked for this particular customer, but not for a neighbor, who promptly sent for Herb Names' service on a worth-while job.

Herb Names is practically out of the minimum service category, having built up a 15-point check-up for $3.85 as a substitute, which he claims is economy for the customer and better business for the firm.

Some time ago Denver newspapers announced that 3,000 local firms had failed to post ceiling prices. Names was *not* one of them. He not only had his prices listed and available for customers' inspection but he has a brief and illuminating history of how he arrived at prices on services he did not render in March; they are the prices of his chief competitors at that time, and he gives names and addresses. He is familiar with all government rules and regulations, quoting them from memory in most instances, or able to find the exact wording in his loose-leaf reference book.

With the stock of appliances still on hand to sell, Names continues the energetic program and policy which has made his organization grow so rapidly since he and two partners started in March 1940. Associated with him at Wells Music Co. were Mora A. Wallof and Walter Neill, salesmen of the same calibre. Top on the list each month, the three decided to go into business for themselves, took on the firm name, "Herb Names, Inc., Modern Living", and in two years have really established the firm as Denver's spectacular business.

Wallof is a specialist at cold canvass and by telephone. Neill has the talent for office and supervision. Names is spark plug and sales manager. Sales of washers averaged one a day as long as stock was available, and average price was $175. Radio average unit sales ran $125. These two lines accounted for two-thirds of the volume. Lines carried were Bendix washers, Westinghouse and Philco refrigerators, Philco and Stromberg-Carlson radio, Norge ranges, Philco-York air conditioning, Royal vacuum cleaners, Simplex ironers, Stokermatic stokers.

The all-glass demonstration room for Bendix washers is typical of the clever merchandising planning and methods, the atmosphere of the store. One salesman demonstrating to a prospect inside the air conditioned 15x8-ft. space does not interfere with another salesman outside telling the good points of the same demonstration to his prospect.

Arrangement of displays is such as to emphasize the merchandise and de-emphasize the salesmen. They are schooled in the art of being part of the service, which inevitably and smoothly leads to an order blank, naturally and without pressure.

Whatever alternate lines or services Names decides to offer his public in lieu of electrical appliances for the duration will be inculcated into the sales personnel in the same well-timed, inconspicuous manner. In more ways than one he is like a hard-hitting quarterback. He can and does call a sales huddle almost on instant's notice by means of an intercommunication system, a new situation is sized up, the play is called and usually it is good for a substantial gain.

Whatever the war emergency brings, those who know Names are sure he will be into it, carrying the enthusiasm of his salesmanship into both his extra-curricular civic activities and his swiftly adaptable and flexible business to meet the situation.

Paint is a Filler

When merchants operating electrical appliance shops are looking around for merchandise to fill in the gaps following the freezing of appliances, the H. L. Miller Co., in Pasadena, recommends paint.

The manager of this company, F. T. Hoover, thinks that paint and enamel for household uses is a natural in a store dealing primarily in household appliances. To this end a very fine grade of paints and enamels known throughout the country has been stocked and placed on display inside the front entrance. Four-ounce and 8-ounce sizes for indoor household use are shown and larger size containers for outside use. Sales have not been bumper but they have been encouraging. Every dollar's worth sold is so much volume and the profit is just so much profit that otherwise would not be realized.

Another item which has done fairly well in this store is the mechanical carpet sweeper. A very good type has been chosen and a fairly good sized stock put in. There can be an end to this item some day, however, but it seems likely that paint will always be a stock item. It is not likely to be frozen.

● REA has prepared and is distributing to customers of its cooperatives a series of free leaflets, reprints from REA News, telling how to use and care for appliances to make them last.

This window display of Valley Electrical Supply Co. at Fresno tied in an appeal for scrap with a boost for Fire Prevention and Clean Up Week. Scrap material was cleverly arranged to indicate the numerous items which war industries can use

Quiz Tells Electreconomy

Popular fad utilized to feel out public response and tell San Diego's newcomers of low cost use

OUT of the weltering mass of wartime restraints and restrictions the advertising department of San Diego Gas & Electric Co. has found something which may be used for promotion of public good-will and sustained interest in using electric current. It is the simple idea of showing how *little* cost will secure *much* comfort and convenience when ordinary household appliances are used.

There is nothing particularly new about the idea. But the manner in which it was utilized by the San Diego company was different.

In a series of folders, planned for distribution among the company's customers, the public was being brought to a more familiar understanding with such terms as "kilowatt-hour" and the actual operation costs of appliances. To assure of a more thorough and more careful reading, the company tied them in with quiz contests. Attractive, not expensive, prizes were offered for the best sets of answers submitted.

The first folder of the series, entitled, *Have You a Punkahwalla?*, and its quiz contest of ten questions, was launched prior to the Christmas holidays. Analysis of results warranted a continuation of the plan and the second was issued on Mar. 15. This second, known as the "Watt Quiz" has recently ended and a survey of its accomplishments has just been completed. The Watt Quiz was based upon a folder titled, *Wot's a Watt's Wage?*

No effort was made to induce the sale of new appliances, nor to foster current usage which would necessitate service extensions at this time. Owners of appliances were urged to take good care of their possessions and have them kept in proper repair, in order that their benefits may be enjoyed as long and as often as possible, and so do their part in maintaining the happy American standard of living.

The quiz contest entry blank, accompanying the *Wot's a Watt's Wage?* folder, contained ten questions. Answers to the first eight questions were to be found through careful reading of the folder—although some of them required actual arithmetic computations. The ninth and tenth questions were designed to give the contestants an opportunity for voicing personal opinions and for stating preferences as relating to different appliances.

Careful study of replies to the first eight questions showed the folders had been successful in firmly implanting the economy-of-use idea in the readers' minds. Analysis of replies to questions nine and ten discovered a wealth of material for foundation building in future promotional activities.

That the public does not resent—but rather enjoys—quiz contests requiring mental alertness is shown in the fact that 93.23% of the replies to the first eight questions were correct. This in spite of the fact that two of the questions required the working out of arithmetic.

Seventy-five awards were made. To the persons who had submitted the 25 best sets of answers, IES floor lamps were presented. To each of the next best 50 was given a carton of six 100-watt lamps. Contest winners received their awards at a general meeting held in the home service auditorium of the company.

Question No. 10 was the one upon which greatest value was placed by the board of judges, three well-known persons not associated with the electrical industry in any manner. This question was: "If you could have only one electric appliance, in addition to electric lights, which would you choose? Tell the reasons for your choice in fifty words or less."

Twenty-five different appliances were mentioned in the replies to this question. Radio took the lead among the preferences in these replies. But this standing — according to the replies themselves — was largely due to wartime conditions. The refrigerator came second. Factors of food conservation, savings by quantity purchasing, savings on tires and gasoline through fewer marketings, and the like were mentioned as guiding the choice to the refrigerator.

Although, as was to be expected, the majority of contestants were housewives—because the folder dealt with home appliances—it is interesting that 32.91% of the entries came from men. Not only were men interested but the majority of their selections were appliances which made for easier housekeeping, and many of these men credited the appliances with the health of their families and the happiness of their homes.

Boys and girls, mostly below the 'teen age, supplied 9.89% of the contest entries. In nearly all cases their replies showed definite evidence of parental assistance in formulating the answers, but many of the youngsters expressed personal opinions.

Recalling that the prime purpose of the folders was to tell the public the value of their electric service and its economy, and that 86,500 of the folders

Inside spread of pamphlet passed out with electric bills in San Diego and at counters in district offices. Outside folds contain the questions asked in the contest and instructions to be followed in making entries. No advertising of the contest was run

ONE CENT U.S.A.
A Watt is one of General Reddy Kilowatt's thousand sturdy little work-soldiers in the Army of Home Defense. A Kilowatt is a whole battalion of a thousand watts — the electrical unit of work done by the Watts.
Wot's a Watt?
THE Whole Battalion of these 1000 willing little workmen will serve you an entire hour for only 3c. Or "Captain Penny" will command a Company of 333 to rush to your aid, day or night, and work sturdily and continuously, for just one little cent each hour.
THE MAJORITY of electric appliances used in the home do not require as many watts as may be employed for a cent. But the WATTS are wise little workers. No more of them go to work than are needed to do the job properly — and they charge only for the exact number of minutes they work. Folks who realize how little they cost use the handy worker WATTS quite often. It is surprising how much good work they will do for very little pay when modern appliances are used.
The pennies show some of the Electric Home Comforts costing less than One Cent for a whole hour of happy use. Ask about others.
General Reddy Kilowatt

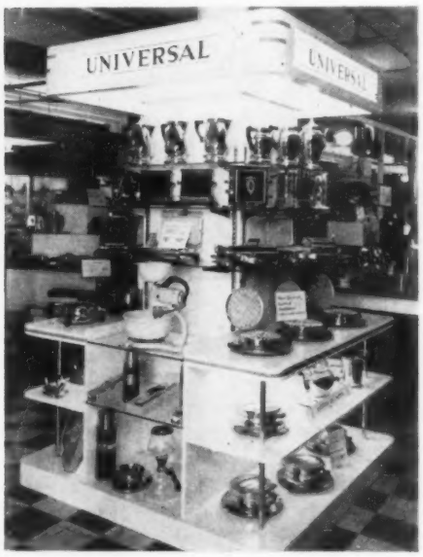
An electric water heater is installed in a Los Angeles defense home—one of 600 such units going into the Marlow-Burns project there. Reasons for the choice, builders say, were safety, silence, surety, space saving and low-cost operation

were distributed in the watt contest, the return of 1,748 entries, or a 2.02% return, was considered to have served its purpose, namely to stimulate extra careful reading of the information and provide a measurement of its effectiveness by a sampling of the response. It is also pertinent that there was no newspaper promotion or advertising of the idea, and only a few spot radio announcements toward the latter part of the quiz period which ended Apr. 30. Circulation was entirely by company bill collectors and at district offices of the company to those who came in to pay bills.

Of the total 52,500 were distributed in the metropolitan area and the response was 2.52%. To the 34,000 distributed from district offices the response was 1.23%, except in Coronado, which had a 2.28% return. Also to be considered is that the 47 days of the campaign were the most turbulent in the early war experience of the country. There were 1,800 distributed to employees of the company in a special contest held for them. Oddly, the same percentage of response was had from this inside campaign.

Some dealers distributed folders, but on the whole dealers did not take advantage of the campaign or see its possibilities or connection with what they had to sell. This, it was felt, was because of a lack of special promotion to dealers. In analyzing the results it was also felt that the distribution by messengers delivering service bills was slow, taking a month to complete and not reaching all customers.

However in fitting into the spirit of the times, the campaign did bring the economy of electric service to the many thousands of newcomers who had recently poured into the San Diego area to engage in wartime industrial activity. Many of these persons had come from sections in which the public had not been so thoroughly educated electrically as westerners were, and the information about rates and low operating costs was real news to them.



Mass display of related items is used effectively by the Denver Dry Goods Department Store to attract attention

● OPERATION of the Home and Appliance Council of the Electrical Service League of British Columbia will be continued for the duration. Members of the council believe that present conditions make it more important than at any previous time in the history of the industry that appliance manufacturers and utilities should maintain contact with the dealers.

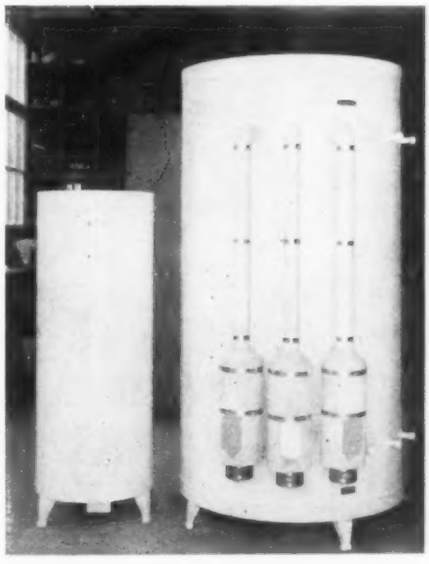
In Lieu of

Housewares take the place of the declining stock of appliances on the display floor of Electric Supplies Distributing Co., of San Diego, in a daring move to keep its dealers supplied with saleable merchandise until the war is over and appliances become available again. Reasoning that the electrical wholesaler must do for the independent dealer what the big chain buying departments do for their branches, Sam Hall, manager, has not only searched the markets for housewares to offer his dealers, but staged a "housewares mart" to show them their possibilities, June 1-7, at ESD displayroom, 435 Second Ave.

A colorful announcement was sent to the trade, ESD field salesmen contacted their dealers, special deals and souvenirs were offered, and the place did a rushing business. Appliance dealers were quick to take on housewares lines to run on for the duration.

An idea of the variety of lines offered electrical dealers by this enterprising distributor can be gained from the following classifications of housewares offered:

Aprons, art pottery, ash trays, baby food warmers, bathroom furnishings and accessories, brooms, brushes, can and jar openers, candles and wax specialties, card tables, carpet sweepers, cast iron cooking ware, choppers for food and meat, chromeware, cleaners, polishes, waxes, clothes dryers, clothes reels, polishing cloths, table cloths, coffee brewers, cutlery, dinnerware, dusters, enameled ware, first-aid kits, furniture cups, furniture polish, garden tools, gift and art wares, glass beverage sets, glass cooking ware, hampers, ice breakers, ice cube trays, insecticides, sprays, ironing tables, pads and covers, kitchen utilities, knife sharpeners, ladders and step stools, metal sponges and cleaners, mirrors, moth preventatives, mops, appliers and dusters, paint and enamel, plastic coated products, plastics, razor blades, record racks, pottery and woodenware.



Midget in name only is this 200-gal. 15-kw. 208-volt three-phase electric water heater built for the new power plant of Tacoma Lighting Dept. by Midget Water Heating Co. of Tacoma. Beside it is a regular 30-gal. tank for comparison. It is equipped with extra taps to provide 5, 10 or 15 kw. additional heating capacity if it should be needed. The tank is for showers at the construction camp for Tacoma's new power plant. A similar 100-gal. heater was provided for the kitchen. Largest heater of this type ever made was one with a 1,000-gal. tank with twelve 5-kw. heaters for Rainier National Park Hotel.

Club's Converted Kitchen Pays

Demand raised only slightly by installation of complete electric restaurant equipment

By Carl L. Hoffman
Washington Water Power Co.

Members of the Spokane City and University Club may now enjoy the beautiful surroundings of its many dining rooms and relish their food with the full knowledge that it is prepared in one of the finest kitchens in the Northwest. Modern electric cooking equipment, new refrigeration, tile floors and walls, plus a liberal application of white paint and new lighting have transformed the kitchen from its antiquity of 25 years ago to one of the places a club visitor should not fail to see. No wife could be more proud of a new home than are club members of their new kitchen. In fact, upon its completion, a kitchen party was held for a large group of guests.

During the winter of 1940 and 1941, the club embarked upon plans calling for complete renovation and the remodeling of certain parts of the building. Chief among the departments was the kitchen, where more than $10,000 was spent. Early in 1941, the electric cooking equipment was ordered and installation was completed in October as follows:

	Connected Load
Lang Range with:	
2—Ovens, 24"x27" each	12.0 kw.
1—20"x25" Automatic Griddle	6.0 kw.
1—20"x25" Hotplate Section	6.0 kw.
1—11"x25" Hotplate Section	4.0 kw.
2—Speed Units	4.0 kw.
Wells fry kettle	
2—F30-208	6.0 kw.
Rainier oven	
1—2-Deck, 40-Loaf Oven	12.0 kw.
Edison food table	
4—Meat Pans	
16—Inserts	7.0 kw.
Back shelf ventilator	3.0 kw.
TOTAL	60.0 kw.

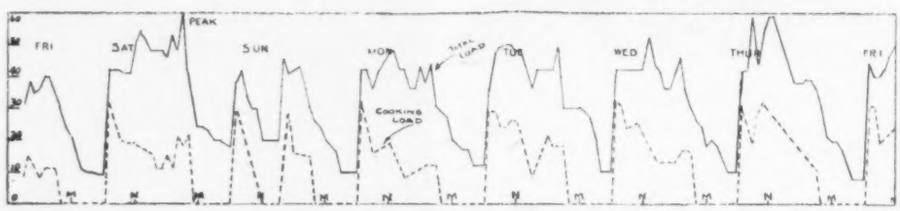
This replaced the gas equipment indicated in the picture taken before remodeling, also a gas oven, formerly used in the baker-pantry department.

The custom-built electric range was constructed to a plan prepared by Chef Armand Caro. It is unique in that the range top is divided, permitting the use of fry kettles at a central point. Another outstanding feature is the back-shelf, grease-extracting type of ventilation, patent pending, which entirely eliminates the overhanging hood with its resulting dirt and grease.

The design of this type of ventilator was furnished by Asa K. Gaylord, engineer for the F. S. Lang Mfg. Co. of Seattle. The theory is to move air at sufficient velocity across the range top and through the grease trap and grease extractors so as to remove all cooking odors and to extract and collect all of the grease in the airflow.

Tests on the cooking equipment were obtained by installing a kilowatt-hour meter and a recording kilowatt-demand meter on the total load of the club building, including the newly installed cooking equipment. Separate kilowatt-hour and recording-kilowatt-demand meters were installed as submeters on the cooking equipment only. These meters were read and the charts removed weekly. The curves shown are taken from a typical seven-day period. The peak load on the Saturday night was due to a party held in the club.

For a thirty-day period of this test, the club used 24,930 kwh. with a maximum demand of 60 kw. For the same period, the cooking equipment used 7,020 kwh. with a demand of 21 kw. at the time of the 60 kw. total peak load. It should be noted the installation of 60 kw. of cooking load resulted in an increase of but 21 kw. to the billing demand indicating the diversity between the cooking load and the general power and lighting load.



Convenient arrangement of deep fry kettles, low vent hood, added oven besides neatness and efficiency distinguished the new (at right below) from its predecessor, which is shown on the left below. Above is the chart made from tests of relation of cooking load to total load during a week of operation, interesting because it shows cooking demand to affect peak but little

The negotiations leading to the purchase of this equipment by the club were handled by Edwin M. Atwood, sales engineer for The Washington Water Power Co. and Asa K. Gaylord of the F. S. Lang Co. Atwood supervised the collection of the technical data to indicate the effect of the installation of cooking equipment upon the maximum billing demand.

Electrical West

Business Guide

For Electrical Dealers and Salesmen

Home-Front Morale

Requires LIGHT

Since last year's lighting season a lot has happened, but none of it makes it any **less** necessary that home morale be kept high. In fact, restrictions on all sorts of things make the home and its morale more important than ever before.

Folks can't gad about as they used to; they have to stay home more because tires just won't let them do different. Not only is more staying at home done, but more work, especially eye work.

Women are pretty generally taking on some sort of war work. They still have all the usual tasks and duties and work of keeping house besides. If they belong to classes, that requires extra home study.

Children will soon be going back to school and will have homework to do again. Even adults who go to training classes these days require outside study and preparation. The man remaining in business often takes home accounts and government forms to fill in, all requiring eye work and study.

The war worker, whether mechanic, draftsman, clerk, or even farmer, works hard. When home he needs restful reading and good light. Eyestrain at home is a kind of sabotage that should not be tolerated anywhere. In war factories lighting is being stepped up to make it easy to see, to improve and speed production, reduce spoilage and accidents. Certainly the war worker's home should protect his valuable eyes, too, by furnishing just as good seeing as he has in the plant.

There's nothing patriotic in gloom and darkness. A blackout may be necessary now and then, or a dimout along the coast, to keep the enemy from seeing, but inside our homes and factories seeing is what will keep us rolling out war materials. England found that out. Some reports from people over there are emphatic that the blackout is worse than the bombing—people want light, they need it, it keeps their morale high.

"So what?" you say, "what can we do about it without lighting equipment to campaign and sell? What can a dealer, salesman or saleswoman do these days about Better Light-Better Sight?"

Inside are some wartime suggestions as to what can be done, what can be sold, what kind of service can be offered your customers. Perhaps it will give you an idea.

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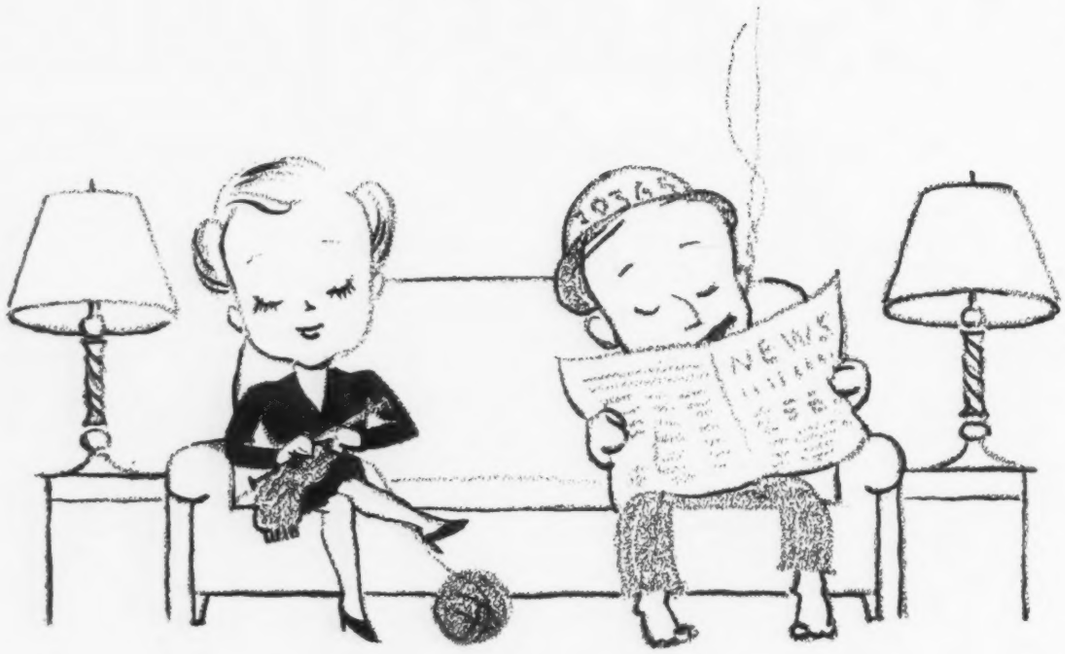
August, 1942



What you CAN DO

about Sight and Light

"The race is to the swift," translated into today's situation means—the one who is swift to make changes to fit the day's conditions will stay in the race. And though the changes required are radical and the returns from them are not immediately promising to many dealers, there is still a job to be done and business to be had from home lighting.

Big relighting jobs may be out, and certainly new outlets or new wiring, unless to add more living quarters for war production workers, are both ruled off. No use kidding, stocks of IES lamps, floor and table lamps, adapters and light-conditioning equipment, ornamental lamps and lighting fixtures are limited—certainly there aren't enough to stage big lighting campaigns this fall. Even incandescent lamp bulbs are restricted to replacement of essential burnt out lamps.

Still this is no time to fold up the lamp department. **As long as there's light there's life.** And it looks very much as though light will be one benefit of civilization that will not be eliminated or cut out for the duration. It is too vital.

Lamp Stock on hand can be displayed and sold. Give it the war angle in advertising and display. Borrow some of the slants suggested by the lamp companies. For instance, in its "America on the Night-shift" General Electric suggests many good ones—

"Good food **builds** the body's resources, but poor lighting **wastes** them."

"You've gotta **relax** to **produce**!"

"The **boys** at the front are counting on the **older men at home**."

"This empty cellarway socket caused this machine to be idle."

Eyes of those doing war work, whether men or women in factories or at home, need the aid of well conditioned light. Tell them so in ads

and display cards as you display IES lamps, light adaptors and lamp bulbs.

Recondition inefficient lamps and fixtures for customers. Sell shades that do not bottle up light, or absorb it all in dark material. Manufacture of shades has continued long after other equipment has ceased. Shades alone require so little critical materials that manufacturers were permitted to make up all materials on hand. So a good job can still be done selling better shades and light diffusers and adapters to recondition old fixtures and old lamps.

Lamp and cord repair is worth developing as a cash and carry proposition. As a part of an expanded appliance service and repair program it can be made to feed in a worthwhile volume to help take care of overhead. While publicity encourages customers to do a lot of minor repairs themselves you know better than anybody how few persons know how to do a really workmanlike job of it. Many people are far too busy with war work, defense classes, extra shifts and duties to bother with such little repairs. Offer to do it safely and expertly for them and you can draw much of it to your store.

Lighting check-up plan. To carry the foregoing a step farther and go out after such business—and still make it pay the cost—why not initiate a combination lighting equipment and appliance check-up program?

For a stipulated amount, offer the customer a complete check-up and tightening up of home lighting fixtures, sockets, cords, plugs, outlets, fittings such as shade holders, canopies, pedestal connections and joints, etc. A similar set of check points to appliances can be combined and put on a card. This card can be used by the repairman as each check is performed.

Such check-up services can be dispatched in such a way that the repairman can make several in one neighborhood in a day and make the service pay, minimize transportation and likewise, often, uncover prospects for real repair and overhaul jobs.

Blackout data. Why not make your store a source of information on blackout, dimout and similar advice and materials? A line of blackout shades and baffle strips, materials out of which to make shields for windows, etc., can take the place of some of the merchandise you can no longer get.

Remember that **you** as well as everyone in the industry has a big investment to protect and perpetuate in the "Better Light-Better Sight" idea, and that if allowed to die out, it will be very costly in time and effort to build it back up again after the war.

PUGET SOUND POWER & LIGHT CO.
PORTLAND GENERAL ELECTRIC CO.
CALIFORNIA OREGON POWER CO.
UTAH POWER & LIGHT CO.
IDAHO POWER CO.
PUGET SOUND POWER & LIGHT CO.

Pleasing with Ads

Eighth of a series of good sense articles on business management

By Ken Hampton

Advertising is telling the world who you are, where you are and what you are there for.

Advertising is the retailer's invitation to the public to get acquainted. Just as in life, if the getting acquainted pleases, friendship follows, and with it trade.

Your advertisement should be a personal message to each of your customers. As such it should be newsy, factual and sincere. It should not only be about something definite but it should tell simply and completely all the customer wants to know about the article advertised. If complete information cannot be given then give as much as possible and tell how the rest of the facts may be easily obtained.

Retail advertising fulfills its function best when it acts as a daily market report on the needs of the moment. It should be directed to the store's customers through mediums they are used to. It should tell a straightforward story of the current parade of articles you have available for your customers.

A store's advertising program should be planned. First a budgeted amount to be spent for advertising should be arrived at. As a general rule 2% of gross sales is recommended for this amount. Then the advertising should be planned to show the store and its organization to the public in the way the owner wants it shown.

If the store's policies are conservative all the advertising should reflect this—if it is planned to create a flamboyant atmosphere then all display and advertising should work toward that end.

When this policy has been hit upon then all means of identification should be used to conform to the impression that is to be created. The store name signs, the business cards of salesmen and members of the firm, truck signs, letterheads, invoices and all firm name signatures to be used on advertisements should be as uniform as possible.

When writing your advertising message write it from the customer's point of view. The customer is the one to be told about your merchandise. Tell him clearly, simply and well what you have for him that you have to sell.

Then check your advertisement to see if it is timely, and honestly and clearly states your offer. For example, does it tell—

(a) What you offer in the way of benefit or service.
(b) Why it will render such benefit.
(c) Where you are located.
(d) When the goods are offered for sale.
(e) How the goods can be obtained and paid for.
(f) Who made it and who you are.

Then check your advertising if possible with your service men and salesmen. Let them read it and work in their ideas of what the customer wants to know. Let them know what you advertise and offer so that they may back you up on it.

Take time and have a regular time to prepare your advertisements. A salesman can correct an error in speech made to a customer, but once published your advertisement stands out coldly to help or hurt you with your friends, the customers.

As a retailer, all of your advertising should be directed to the restricted area in which your customers reside or work. You want to reach these customers with repeated invitation to patronize your store. To do this, identify your store with adequate signs. Use good displays in your windows. Above all, use proved advertising media such as newspapers, radio stations, steadily and regularly. Use direct mail, billboards and other special media sparingly and then only on expert advice. As for congratulatory messages and local school papers, event programs, etc., consider any expenditure as a **donation,** not advertising, and you won't be disappointed in results.

There is no question any more as to the value of advertising to a retailer, for time has repeatedly proved the truth of the old saying "Either a merchant advertises or the sheriff does" and no one likes to read the sheriff's sales copy on his own business.

It is not the function here to make suggestions on copy or layout for advertisements but every merchant should have as part of his trade tools a text on advertising fundamentals and read it at least once and leaf through it occasionally.

These two suggestions are pertinent: (1) Everyone likes to look at pictures, so use illustrations lavishly. (2) Everyone likes to read personal letters, so use testimonial copy when it is possible to do so sincerely.

Above all, tell a complete story: from size to price about the article you advertise—from whom you are to why you are there, about your store; and tell it consistently and often.

Machine Tool Builders . . .

the men behind our war production achievement

It took Germany six years to get ready for this war, and Japan even longer. But in less than twenty-four months American industry, starting from scratch, has caught up with and surpassed the war production of the Axis.

When France fell in June, 1940, we unfortunately had no gigantic munitions makers, like the Krupp or Skoda works, to turn to. We had been devoting our attention to making refrigerators and vacuum cleaners and motor cars and lawn mowers. Ordnance output for our Army was a mere million dollars a month. A sad commentary on our National state of mind and our lack of responsible political leadership.

Yet during June of this year, our industries, transformed from peacetime pursuits, produced close to a thousand times that amount. A thousand-fold increase in two years!

The same spectacular gains hold throughout our war program — for ships, planes, guns, tanks, a thousand items. We are well on our way toward the 60,000 planes, 20,000 anti-aircraft guns, 45,000 tanks and 8,000,000 tons of shipping that the President asked us to produce in 1942, and toward the much larger production projected for the year 1943.

We are well on our way thanks to a number of factors, one of the most vital being the extraordinary job done by the machine tool industry. For it has equipped America's metal-working shops with the tools they need to turn out the vast quantities of war weapons.

The machine tool industry's importance springs from the fact that almost every metal product, from mechanical pencils to giant guns, is made with machine tools. They transform pieces of steel into parts for automobiles, farm implements and radios — and for airplanes, guns and tanks.

The Garand rifle, highly praised by General MacArthur at Bataan, has 72 metal parts requiring 1040 separate cutting operations on machine tools. A 40-millimeter gun mount is made up of 1500 separate parts, built to the tolerance of a Swiss watch. Each part must be machined, not once, but several times.

No wonder that when the American defense program was undertaken two summers ago, the American machine tool industry was the first to be called into service. Ninety-five thousand machines were wanted as quickly as possible from 250 builders who in peacetime had produced some 25,000 machines a year.

But the demand did not stop there. The Army, the Navy and the Air Force kept asking for more as the war production program was expanded again and again. Nor was that all. The entire anti-Axis world besieged Washington with urgent requests — from London to Moscow, from Ottawa to Chungking.

To a man the machine tool builders responded. New factories and additions to old plants were built, with deliberate disregard of the prospect that all these sharply expanded facilities could not be used after the war.

To increase output from existing plants practically every company went to two long shifts or three short ones. The industry's work-week was greatly extended. From the beginning of our effort, it has been the longest of any industry.

Working forces were enlarged from 40,000 to 110,000, and this latter figure does not include tens of thousands of employees with sub-contracting firms. Though machine tool building requires a higher degree of individual skill than most products, "learner" courses have been set up to train men quickly. Over 15,000 men and women now are in training.

The machine tool builders were among the first to go in for sub-contracting. They have farmed out parts, subassemblies and complete

machines right and left. To meet their needs, for example, repair shops of carpet mills are making milling machines, a laundry machinery company is producing radial drills, and an automobile body builder is making planers and boring mills.

Machine tool manufacturers quickly shelved peacetime practices to concentrate manufacture on the sizes and types of machines critically needed for the war program. They adopted mass production methods wherever possible, although machine tools are essentially a tailor-made product. They sent their sales engineers, as did machine tool dealers also, to hundreds of munitions makers with invaluable advice as to tooling up most efficiently for their particular jobs.

The swift action taken by the machine tool builders shows what private enterprise can do to meet a national emergency. They were the first to institute a voluntary system of priorities.

All of this involved an almost explosive expansion of the industry. Machine tool builders produced an average of only 7,500 machines a year from 1931 to 1934. In an ordinary year, output totals 25,000 machines. But in 1940, it rose to 112,500, and in 1941 to 187,500.

The 95,000 machine tools wanted for the original defense program were built and delivered within eight months.

Today more than 1,000 machine tools are being shipped to war factories every twenty-four hours, and for seven days a week. Each month's output exceeds that of an entire normal peacetime year and is five times that of the depression year of 1932. And each succeeding month is shattering all previous records.

It is this amazing performance that led Under Secretary of War Robert P. Patterson to declare that "machine tools are the foundation on which our production structure is built. American machine tool men are doing a stupendous job. Machine tools are now being turned out at a rate of $1,380,000,000 a year. Machine tool designers have worked to improve tools so much that machine tool effectiveness today is one-third to one-half greater than it was in 1930. Our production today is 16 times what it was—in capacity to cut metal—at the peak of the World War."

The results of this performance by this key industry, so satisfying to the Nation, do not spring wholly from the numbers of machine tools produced. They stem also from their improved quality and greater productivity.

Today's warfare differs radically from that of 1917-1918. It calls for mechanized weapons so complicated in design and built to such a fine degree of accuracy that they are beyond comparison with the weapons of a generation ago.

Machine tools, completely redesigned during the depression years, are meeting these new and exacting requirements. In addition, thousands of machine tools of special design, without counterpart in peacetime work, have been built.

The record of the war industries most directly dependent on the machine tool industry speaks for itself. One tank manufacturer alone is producing more than thirty big tanks a day. A midwestern plant is completing 35 anti-aircraft guns a day, round the clock without interruption. A tank engine factory, tooled up to make 650 units a month, is actually building over 1500 a month. Demolition bombs, destined for Berlin and Tokyo, are being made by the tens of thousands every month. Machine guns are being produced at a rate of 50,000 a month.

These manufacturers, all machine tool users, are far in advance of the timetables set for them.

All this is good news for the American people and bad news for the Axis. It is proof that American industry, with each individual and specialized industry doing its part, is living up to the faith put in it by the American people.

But it is more than that, too. It is a guarantee of our confidence in the peacetime future of American industry and of the free enterprise system under which this miracle has been wrought.

Perhaps more than anything else, the foundation of that confidence must be faith in the farsightedness, the ingenuity, the engineering and designing skill, and the managerial know-how of the machine tool makers.

On them we depend for the most essential tools of the post-war production economy. Without them, our vision of better living standards and full employment through more efficient production and distribution can never be more than a vision.

What they have done as the toolmakers for war is proof of what they can do as the toolmakers of peace. How they have done it as free men is a demonstration of what free men will do.

James H. McGraw, Jr.

President, McGraw-Hill Publishing Company, Inc.

This message is appearing in all McGraw-Hill industrial and business publications, reaching over a million readers.

Copper and Rubber Tighten

Price freeze still not clear on construction, NECA working on it; electric ranges unfrozen; other WPB, OPA developments

LIFEBLOOD is a word applied to many seeming essentials, but when related to copper and rubber in the electrical industry it has real meaning. Copper provides the bloodstream as conductor of electricity; rubber in its function as insulator of electric currents must be the arteries and veins. Because war machines require so much of both rubber and copper electricity is being starved of these materials in new rulings issued during the past month. That factor of safety provided by the standards of the past is being shaved closer and closer to 0.

War agencies, including Army, Navy, Maritime Commission, are required by the War Production Board to use its specifications for insulated wire and cable. Non-military users have had it since April. Less reclaimed rubber is permitted in insulations, and less crude in jackets. Jackets for heating pad cables are out.

Contractors are notified that priority assistance cannot be granted any longer for insulated wire and cable to wire buildings or parts of buildings *which can get along for the duration of the war without electric service.* The WPB building materials division is refusing priority assistance for repair or maintenance of a residential lighting circuit where another lighting circuit is still functioning in the same house, *except where actual fire hazard can be shown.*

Copper wire stocks, supposed to have been reported to WPB in a recent questionnaire, are considered frozen and are not to be used except on high priority construction. Late in July, P. A. Tucker, chief of the frozen materials branch, toured the West and established three regional offices of the requisitioning branch under W. D. Cloos, at WPB headquarters in San Francisco. Two other offices, one in Los Angeles, one in Seattle, will be able to give speedy service on interchange of these frozen stocks.

If a contractor needs a quantity of wire for a high priority job, but faces long delays in getting stock from his suppliers, he should apply to Cloos for help. From the reported inventories of wire, the requisitioning branch can locate stocks, help to negotiate the purchase of such stocks, and in extreme cases can requisition. Likewise this branch can unfreeze and requisition stocks tied up in bankruptcy or settlement of an estate.

Rubber, in the shape of tires, wore thinner too, with less hope of replacement, during July. In fact OPA is studying drastic new cuts in the list of trucks eligible for tires. Contractors complain that the reduction already denies them the opportunity to make a living since their close-by local business has stopped and defense housing jobs are far away and require much mileage to get and to install.

OPA has set up a decentralized tire rationing branch in San Francisco, Los Angeles, Phoenix, Denver, Boise, Portland, Salt Lake City and Seattle.

P-19-A and P-19-H preference ratings have been amended, (July 7) to permit extension on certain expendible materials consumed in construction of projects. Before only materials physically incorporated into the finished product could be included and a PD-1A was necessary. Abrasives, perishable tools, scaffolding, forms, are included, but not fuel, machinery or repair parts.

An amendment to Regulation 10, the allocation classification system, makes it applicable to purchases by distributors who buy for resale to retailers. Dealers are retailers only to the extent that they sell to ultimate consumers other than industrial or commercial.

Super-ratings are now granted certain war agencies overriding A-1-A ratings. There are AAA, AA-1, AA-2, etc.

P-46 has been amended again to permit a utility company to sell materials from excess stocks to any other utility or war production plant with a rating of A-5 or higher.

PD-1A applicants are advised by WPB to enclose with their application blank a self-addressed post card. On it their case number will be stamped and returned to them to facilitate tracing subsequent inquiries about the application. Two weeks should be waited before inquiring it is advised.

Electric ranges, frozen since May 2, were released July 16 for sale to the public upon certification that a new rance is required to replace one worn out, damaged beyond repair or destroyed, or that no other cooking equipment is available and that the premises are wired for a range. The order releases ranges having a factory sales value of $80 or over. Others must be held for defense housing or war agencies.

Used refrigerator prices will not be increased, OPA has decided despite appeals from dealers who contended that schedules were too low to cover costs. OPA also warned that practices attempting to evade the ceiling would be stopped. Rentals or forced rentals before purchase at the ceiling price are considered in that class.

Portable lamps and shade manufacturers were given an extension, on July 13, permitting them to use up existing supplies of fabricated or semi-fabricated metal, metal parts, cords and silk.

Manufacture of an additional long list of civilian articles was prohibited by WPB in order M-126, July 13. Among the specific items prohibited are: commercial electric cooking stoves, dishwashing machines — except hospitals, door chimes, electric water coolers except on special certificates, hair dryers, ice cube trays, lighting poles and standards, show window lighting and display equipment, ball park lighting systems, garbage disposals, stage lighting reflectors and equipment, air conditioning systems, except for army or navy use.

Application of price ceilings to commodities is relatively simple but when these are mixed up with labor and construction conditions, just what *was* the price last March and how can it mean much in July? It is upon this difficulty that electrical contractors were still confused as to the effect of the ceiling orders on their business. National Electrical Contractors Assn. is maintaining to OPA that construction work cannot be pegged because there was no set price in March that relates to a price in July for a different job, done under different conditions, with increased labor costs and transportation difficulties. The issue is not yet cleared, although opinion is that electrical contractors are covered in several aspects of their business.

Biddle Trade Bureau analyzes the contractor, dealer and motor shop coverage thus: General Maximum Price Regulation covers (1) all retail sales, (2) all contract work for industrial and commercial consumers, (3) all new construction work except time-and-material work for industrial or commercial consumers when material is under No. 136 and labor under GMPR. No. 165—Consumer Service, covers, (1) all shop repairing for retail consumers (radios, appliances, etc.), (2) all repairs or alterations to residences. No. 136—Machines and Parts, covers, (1) materials sold to industrial or commercial consumers including materials used in construction, alteration or repairs when sold on a t&m basis, (2) sales, rentals, repairs of motors or other apparatus listed in Appendix A or B when sold to other than a retail customer.

Evidently OPA has in the making a regulation covering contracting, but opinions still differ and contractors continue to await definite instructions.

Hospital Equipped for War on the Pacific

Modern electric facilities help make Shaughnessy Military Hospital at Vancouver one of the most up-to-date plants of its kind in western Canada

ITS former 250 bed capacity stepped up to 400 since the advent of war on the Pacific, Shaughnessy Military Hospital, operated by the Federal Department of Pensions and National Health of Canada, at Vancouver, B. C., is one of Western Canada's most up-to-date hospital plants. Originally designed to replace the original hospital, the old building too is being remodeled.

Electrical equipment is of the most modern design. All service cables for light, power, telephone and other low tension systems are brought into the building underground. The supply for light and power is 2,300/4,000 Y, 4-wire with grounded neutral. Two paper insulated, lead covered cables enter the transformer vault inside the building, and are connected directly to the terminals of a 4-pole, double-throw gang-operated disconnecting switch so that either cable may be selected. The second cable acts as an emergency stand-by. Cables are fed from two separate sources by the B. C. Electric Railway Co.

In the transformer vault there is the necessary primary switch gear, transformers and protective equipment for controlling the two primary services and the primary feeders for light, power and X-ray. The main service switch is a 400-amp., 7,500-volt, 3-pole, single-throw enclosed oil circuit breaker, with rupturing capacity of 30,000 kva. at 5,000 volts. The breaker is manually remote controlled from outside the vault, the operating handle interlocked with the main gang-operated disconnecting switch so that the latter cannot be operated under load.

Three 100 kva. 2,300/115-volt, single-phase, oil cooled transformers are used for light and three 50 kva., 2,300/230-volt transformers for power. For the large X-ray machine one 25 kva., 2,300 to 115/230-volt transformer is used, and for the small X-ray the transformer is 15 kva., 2,300 to 115/230 volt.

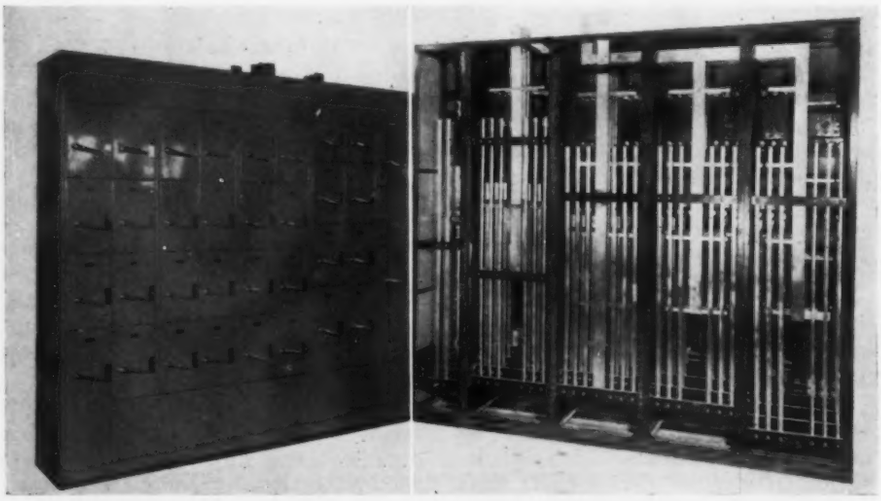
Secondary connections for light are 115/199 volts, 3-phase, 4-wire, with solid neutral, while for power 230-volt, 3-phase is used, and 115/230-volt, 3-wire, single phase for X-ray. Open copper bus work is erected in the vault.

Adjacent to the transformer vault is the switchboard room. The main switchboard is of the deadfront type and consists of an assembly of automatic, fuseless circuit breakers. In fact, no fuses are used in any part of the installation.

The switchboard contains a magnetic switch for each X-ray feeder so that each feeder may be connected by a push button station in each X-ray room. The feeders for light and power leave the switchboard room under the floor, and rubber covered, lead covered, cables are installed to each riser location.

There are two fully equipped major operation rooms in the hospital. The operating room lighting fixture in each room consists of a special built-in multiple system of lenses so designed as to converge the light beams to a high intensity on the operating table. The unit contains 18 150-watt lamps and group control is provided from five local switches so that varying intensities of light may be obtained. The intensity on

The deadfront-type switchboard below consists of an assembly of automatic fuseless circuit breakers. Feeders for light and power leave the switchboard room under the floor and cables are installed to each riser location. At top of page is the reinforced concrete hospital building. Main section of the double H layout is 370 ft. long and wings are 200 ft. Bed capacity has been increased to 400 since Pearl Harbor



the operating table is as high as 1,500 ft. candles. Each operating room contains six sterilizing fixtures with two 18-in. germicidal lamps in each fixture.

The nurses' silent call system is wired so that a patient may operate a call button at his bedside and summon a nurse by means of a single light over his bed, over the ward door, and in the duty rooms. The nurse answering the call may reset the calling station by means of a reset button which is incorporated as part of the calling station. In the infectious wards the calling stations are operated by a heavy silk cord which can be removed and burned after the patient has been removed.

There are two nurses stations on each floor and all calls register in both stations. Calls which originate in the opposite end of the building which are normally answered by the nurse in the other section, are indicated in each station by a green lamp.

Any doctor entering the hospital by the doctors' entrance may throw a switch opposite his name on the entrance register, and it will light a lamp behind his name on the entrance register and on an indicator installed in the information office and telephone exchange.

Doctors may be paged from the information office by a silent flashing lamp type paging system, which has an audible chime signal for emergency calls. To call any doctor the operator sets up the doctor's call on a selector keyboard which automatically flashes a signal to annunciators located throughout the hospital, adjacent to nurses' stations. Three doctors may be paged at one time and up to 190 doctors' numbers can be handled on the board.

A master clock is located in the information office which sends out impulses to secondary clocks and time stamps located throughout the hospital and administration offices.

The fire alarm system consists of break-glasses located in various sections of the building, operating 12-volt fire gongs in the administration section and 12-volt fire alarm buzzers in the hospital section.

The original of all fire alarm calls is indicated on fire alarm annunciators which are located in all nurses' stations, in the boiler room, and in the information office. A red lamp is also located adjacent to each annunciator so that a visual signal is made when an alarm is turned in.

The radio distribution system consists of three radio channels, a public address and a phonograph channel. Individual head sets and station selectors with volume control are provided for each bed. There are three radio receiving sets, one for each channel and a phonograph pick-up and turntable for the record channel. Microphones are also provided for public address, and provision is made for the installation of a microphone on the stage so that any entertainment from that point may be relayed throughout the hospital.

In addition to the public telephone there is a complete system of intercommunication telephones between all nurses' stations and the matron's office. There is also an inter-communication system in the administration office, consisting of three master stations, any one of which can talk to twenty outlying stations. All telephones are designed for desk mounting, and are of the loud speaker type, although earphones are provided to insure privacy on the master stations.

The hospital has a well equipped auditorium with stage fitted with border lights and disappearing type footlights. The latter are in sections which are switched off automatically as each section closes, to avoid risk of fire in case the lights were accidentally left burning. The footlight and borders, which are both wired for three colors, are controlled from the stage switchboard. Stage and well pockets are provided so that special effects may be easily secured.

One electric oven and a variety of other electrical equipment is used in the main kitchen in conjunction with steam equipment. There are a number of electric food carts which can be plugged in at wall stations in the kitchen and, when loaded, wheeled or taken up in the elevator to various diet kitchens where they can again be plugged in and the food kept warm while it is being served to the various wards.

Over the main entrance to the hospital low intensity floodlights have been installed in concealed position to bring out the architectural details, and illuminate to relief murals on either side of the entrance. Floodlighting is also provided on the building for illumination of the grounds and driveways.

A great number of the lighting fixtures used in the building were specially designed to meet individual needs of various departments of the hospital, or to conform with architectural details. The electrical work was handled by Hume & Rumble Ltd., electrical contractors, Vancouver and New Westminster, under the supervision of R. Lennox Mackenzie, consulting electrical engineer, who designed the entire electrical installation. Mercer & Mercer were the architects on the job.

● OLD FUSES, iron cords, switches, fittings of any kind must be turned in before new will be sold for replacement, according to a new regulation in Canada. Some confusion resulted at first because the order was not given sufficient publicity. The worn out device is accepted as proof that the new is for replacement only.

One of two major operating rooms in the hospital. Use of a built-in multiple system of lenses makes it possible to converge lighting intensity as high as 1,500 fc. on the operating table. The unit has 18 150-watt lamps, with group control from five local switches. Sterilizing fixtures in this room contain 18-in germicidal lamps

Oakland is Prepared

Newest two-way F-M police radio system, with portable auxilliary set, new police radio switchboard center, completely organized civilian defense control center and personnel well trained, air raid sirens located to reach into hill canyons, dimmed-out street lights, make this city a model community

Radio control board, with two transmitter sections on each side of center speaker, Audiolog at the end

FIRST two-way, frequency modulated police system in the West focused attention upon the complete communications organization of the city of Oakland, Calif., for emergency or disaster. While the installation of this newest form of police radio is newsworthy in itself, its place in the coordinated defense program of the city, under assistant city attorney Homer Buckley, brings to light that city's handling of air raid sirens, dimout, organization of a central defense command and implementing it with an emergency control center. In these electrical provisions, Ben Hill, superintendent, and G. V. Tudhope, assistant superintendent of the electrical department, now play their part as the technical experts of the defense council and designers of electrical facilities to expedite its work.

The two-way, f-m police radio, designed by Tudhope, consists of a main 400-watt transmitter, with an antenna 391 ft. above the street on the city hall flagpole, 430 ft. above sea level, and four others in the hills of Oakland at elevations from 500 to 850 ft. This transmitter operates at 31.1 megacycles. For emergency use a 50-watt, f-m portable transmitter can either be operated from a separate antenna on the city hall tower or from the field in case of disaster. Connection between the transmitter sets and their respective antennae are carried in gas filled coaxial cable. Equipment is General Electric.

Mobile units in the individual police cars will consist of 25-watt f-m sets designed to receive the 31.1 meg. signals and answer on an f-m wave length of 30.58 meg. Some delay in receiving equipment has held up fully equipping all the police cars at the present. Such cars have been equipped with one-way amplitude modulated sets in the past.

Push-to-talk type hand set microphones are provided the mobile units and cars are equipped with a single quarter-wave type antenna for both receiving and transmitting.

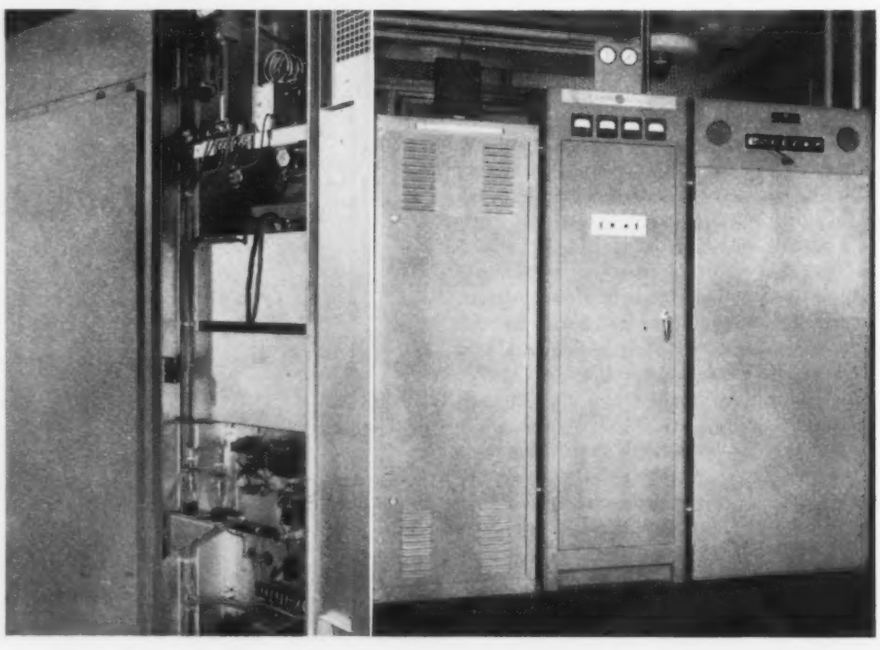
A radio control board, located in a sound proof room, is 13 ft. long, with space for five men should occasion demand. Equipment is mounted on four hinged gates at its back for ease of servicing. To the left of the operator is the 50-watt transmitter section, to his right the 400-watt set and the mobile location board. Center section contains the loudspeakers of station KALT and space for indexed beat assignment and street location books. The two transmitter sections are interconnected and interlocked for throwover.

The mobile location board, with color coded plugs and numbering corresponding to officers and beats, enables the dispatcher to select the proper mobile car for any class or type of emergency call. This method of dispatching and assigning police mobiles is faster and more accurate than any heretofore used in police radio dispatching.

A sound recorder and amplifier or Audiolog is located at the end of the table. This device permits four hours of continuous recording, automatically started and stopped by the transmitting mechanism, to keep a record of both sides of telephone and radio emergency calls, dispatching broadcasts and conversations, or to record broadcasts from the state transmitter.

The police radio, as well as all other city communications, is tied in with

Opened door at left below reveals interior of 500-watt frequency-modulated radio transmitter. At right, in three compact panels, transmitter and receiving sets at police headquarters. For emergency separate and portable 50-watt set can be used



Called in emergency by a member of the police force, (as at extreme right) the defense control center is manned by heads of each emergency agency and force (at left) and 20 volunteer telephonists who take incoming calls from the field

the control center for the Oakland defense council. Oakland's defense council has been set up on a permanent basis, with a competent full-time key staff in addition to volunteers, adequately financed, and well rehearsed and trained.

Facilities for the control center, located in sound proofed, gas proof, ventilated quarters, are well equipped electrically. In one room are located 20 incoming telephone lines with stall booths for each operator. Food supply for several days, sleeping accommodations, auxiliary lighting, make it an emergency prepared center. Lighting is furnished by 320 ft. of custom built white fluorescent tubular lighting, installed against the ceiling over the work space. Installed by Electrical Products Corp., it provides 25 ft. candles of well diffused glareless lighting since the tubes themselves operate at low brightness.

Upon receipt of an alert signal, ten of the 20 telephone stations are immediately manned by police officers and firemen on 24-hr. duty nearby. They call a list of people posted in the booth. These include department heads, representatives of the PG and E, telephone company, water district, Red Cross, health department, and 30 volunteer girl telephonists who live within 10 minutes' walking distance and whose identification cards admit them through police lines. They relieve the officers on the boards.

In the next room is the control center for the operating heads, previously mentioned, each of which is identified, has his own private line. Reports received from the block and sector wardens, policemen or firemen and auxiliary firemen called to duty as to damage, fire, trouble of any kind, are taken down, turned over to the operating head concerned to deploy equipment or personnel to the scene.

Like many another city Oakland did not turn over to its electrical department the selection and placing of air raid sirens until a number of too zealous councilmen, plunging into the emergency with goodwill but little technical knowledge, had experimented with what appealed to them as the thing to do. Accordingly six gasoline engine driven siren sets were purchased and installed in the towers of six fire engine houses. To operate them requires a warning over the fire alarm system and manual starting of the engine set by the fire department.

In addition to these, after the first blackouts revealed the inadequacy of these sirens, the siren at the Tribune tower, the whistles at shipyards and factories were enlisted.

While most of Oakland is on fairly sloping and reasonably level terrain reached by sirens, much of its residential section is in the canyons of the hills rimming its eastern edge. Sirens, to reach dwellers of these canyons, Ben Hill found, have to be placed at the mouth of the canyon to allow the sound to travel up.

Accordingly 12 new Federal 2-hp. sirens have been purchased and have been located to catch such dead spots as existed. These are operated off fire alarm box circuits controlled by a master timer. Direction of wind, location of obstructions, atmospheric conditions, all influence the effectiveness of such sirens.

"If I had to do it over again," said Ben Hill, "I would recommend sirens not smaller than 2-hp., located on public utility poles spaced a mile apart, giving approximately a ½-mile radius, throughout the city. For Oakland that would take from 50 to 60 sirens. Then they should all be actuated from one central point."

Oakland's dim-out, fortunately for land interference of San Francisco and Yerba Buena Island, is limited to a portion of the city beyond 24th St. to Berkeley. Street lighting dim-out therein is being handled by the utility in the manner described previously. (ELECTRICAL WEST, July, p. 60.)

With these facilities, Oakland is mobilized for its emergency, should it come. The fact that it is organized to handle it may have much to do with the possibility of it ever being called upon to use its training and preparation.

More Code Changes

More interim amendments to the National Electrical Code, in general permitting relaxation of standards to aid the war effort, were announced by the chairman of the Electrical Committee in June. One amendment, No. 48, permits more conductors in outlet, switch and junction boxes of various sizes. No. 50 makes changes and additions to the table of conduit sizes for various numbers and sizes of rubber covered wire, permitting smaller conduit in many instances than formerly. No. 51 finally recognizes threaded fittings for electric metallic tubing where only threadless fittings could be used before. Threads are not standard pipe thread, but a finer, closer spaced thread. Bending at any part of the thread, however, is prohibited.

Another substitution of materials was announced by the Underwriters Laboratories for the emergency. Steel binding screws for fittings, steel binding nuts and washers instead of brass, will be permitted. The identification of the grounded circuit wire screw can be made by painting the head white. Such steel screws are not to be used where exposed to the weather, and in any case the terminal plate against which the wire is clamped must be non-ferrous.

LIGHT for offices of a LAMP COMPANY

Fluorescent

Who

South Pacific sales division offices of General Electric Co., Lamp Department, at Edison Building, Los Angeles. Illuminating engineering design by Alston Rodgers, division illuminating engineer. Installation data, conditions, results, for each office are listed below:

Entrance

Two luminous pilasters, 7 ft. 8 in., with 6-ft. luminous section of Corning Pyrex glass panels, No. 90337, have two 30-watt T-8 Mazda F lamps in each section, four lamps per pilaster. Set in each corner, with heavy moulded glass panels, interesting blends of color can be obtained. Decorative bronze housing designed by Wagner-Woodruff Co., Los Angeles.

E. P. Markee's Office

Division manager's office, 17 ft. wide, 21 long, ceiling height 9 ft. 9 in. General illumination is from two special Muralaire units with curved panels of white lamicoid plastic, open top and bottom to furnish strong component of indirect light to the room, and direct light to ceiling and wall; mounted on each side wall. Dust collection is minimized. Double row of 48-in. white Mazda F lamps are completely shielded from view. Sections are 16 ft. long, mounted 20 in. from ceiling. Average illumination 20 fc. Luminous skylight on ceiling above and back of the desk contains four 40-watt white F lamps, directed toward the desk by two rows of Holophane fluorescent lens plates. Front and back panels of white lamicoid are illuminated by another 40-watt F lamp, and may be separately switched. Total wattage of skylight 300, inside units 800, total 1,100 watts. The skylight unit provided over 50 fc. on the desk area. These special luminaires were built by Commercial Reflector & Mfg. Co., Los Angeles.

Salesmen's Office

Measuring 37 x 17 ft., with a 7-ft. partition set 11 ft. from the rear wall to make the office of W. H. Robinson, Jr., assistant manager, at rear; ceiling is 9 ft. 9 in. at far end; 9 ft. in front. Joined together are lines of Wakefield "General" luminaires to form four fixtures, each 15 ft. long. Each contains two rows of 100-watt white Mazda F. lamps; total wattage, including auxiliaries, 2,820 watts, or 4.5 per sq.ft. An average of over 50 fc. is produced.

Reception Office

An average of 50 fc. general illumination is obtained from two 15-ft. fixtures, composed of three 4-ft. sections of Curtis "Starlux" luminaires (basic section No. 1411, extension sections No. 1412), suspended 9½ in. below the ceiling and spaced 8½ ft. apart in a room measuring 18 ft. 9 in. x 16½ ft. A shallow decorative louvre extends down the center on the under side of each fixture; the outer panels are of etched glass. Four rows of 40-watt Mazda F lamps, soft white in the outer rows, and 3,500°K white in the center rows, in each unit provide a pleasing color on the vertical surfaces in the room, while the white lamps blend well to make an excellent working light on the desks. The 24 40-watt lamps total 1,200 watts, including auxiliaries, or 3.9 watts per sq.ft.

EMEA *Dope Sheet* — *Edited by Howard C. Park*
EMEA of So. Calif

Ball Bearing Service Fundamentals

From a maintenance engineer's standpoint the servicing of a ball bearing usually begins with removing the bearing from its shaft and housing.

As much care should be exercised in removing bearings, as in mounting them.

If bearings are improperly removed from their mountings, they may be damaged by:

1—Brinelling of the ball races.
2—Ruining of the balls.
3—Spalling of the bearing seats or rings.
4—Damaging of the grease seals.
5—Damaging of the ball cages.

When dismantling a motor or machine, some means should be used to mark the various parts that comprise the housing and bearing assembly of each bearing. If this is done, and the bearing has given satisfactory performance, it will insure the correct alignment, spacing, etc., when the bearing is reassembled. Furthermore, if the bearing has not given satisfactory performance, it will greatly aid in determining the cause of trouble.

Removing End Bells

End bells usually are very readily removed. Should they bind or be difficult to remove, pressure should be applied equally to the diameter of the end bell to prevent damaging the balls, brinelling the bearing races or spalling the bearing seats.

Removing Bearing from Shaft

The method used to remove the bearing from the shaft will be determined largely by the type of assembly of the shaft or gears, etc., that may be adjacent to the bearing. Whatever the method employed, the pressure to remove the bearing should be applied, if at all possible, to the inner race of the bearing. Only in infrequent cases will it be found to be impossible to get some kind of tool behind the bearing to remove it by pressure on the inner race.

It may be necessary to make or procure special devices to insert behind the bearing, such as split rings with collar to contact inner race only, etc.

When it is impossible to remove the bearing by any other means than applying pressure to the outer race, the pressure should be distributed over as great an area as possible.

Pressure should be applied to the bearing so it will be:

1—Exerted on inner race (if at all possible).
2—Widely distributed around outer race.
3—Equally distributed around bearing race.
4—Parallel with the shaft, or at right angles to the bearing.
5—Steadily applied, especially if applied to outer race.

Methods of Removing Bearings From Shaft

The four most commonly used methods of removing bearings from shafts are:

1—Hammer and drift pipe.
2—Press.
3—Bearing puller
4—Bearing cartridge or gear.

Hammer and Drift Pipe

The hammer and drift pipe is, no doubt, the most commonly used method of removing bearings.

The pipe should be of sufficient inside diameter to clear all threads, shoulders, etc. of the shaft; but not too large to contact securely the inner bearing race. The outside diameter should not be large enough to injure bearing shield or ball cage. The pipe should be clean and of such material that the metal will not flake when being used.

The hammer should be of metal that will not flake when being used. The blows of the hammer should be applied alternately and evenly around the edge of the pipe and should be as light as possible to remove the bearing.

Press

When the size and shape of the shaft assembly permits, it may be an advantage to use a press to remove the bearing.

Two bars of equal height or a split ring may be inserted behind the bearing.

Care should be taken to see that the shaft is parallel—or the bearing is at right angles—to the press plunger. This precaution is especially advisable when a press is used, as the compounded pressure of the press may inflict damage to the bearing before it is noticed that the bearing is jamming.

Bearing Pullers

When a bearing cannot readily be removed by the hammer and pipe, or press, a bearing puller may be used.

Many different types of bearing pullers are available. The greatest danger in using a puller is the temptation to remove the bearing by applying the pressure to the outer race of the bearing.

It should be remembered that whatever method of removal is used, the pressure should always be applied to the inner race—if at all mechanically possible.

Split collars plated, split rings, flat bars, etc. may permit the puller to be used without damaging the bearing.

Bearing Cartridge or Gear

Usually when gears, bearing cartridge, etc., obstruct the application of tools behind the bearing, it is possible to remove the bearing by pulling the cartridge or gear, etc. However, care should be taken not to damage the gear or cartridge. If the bearing is to be removed by pressure on the cartridge it should first be ascertained if the cartridge casting is designed to permit the application of pressure.

Heating

Should it be impossible or impracticable to remove a bearing by any other method it may become necessary to expand the bearing by applying heat. Heat may be applied to the inner race of the bearing by several methods. Usually, this can be accomplished by pouring hot oil —212 F. to 257 F.—over the bearing. If possible to avoid, it is not advisable to use an open flame to expand the bearing ring as the bearing will be ruined and the shaft may be distorted. If any form of heat application is used in removing the bearing the shaft should always be checked to ascertain if the shaft has become warped or bent.

Caution in Removing Bearings

Too much caution cannot be exercised in removing a bearing. Usually, the damage done is not known until after the motor or machine has been reassembled. The damage may be caused by:

Hammer blows loosen ball cages, grease seals or shields. If outer race is driven by hammer blows the balls and races may be brinelled.
Pressure on outer race—by any method—may damage balls and races.
Burring of shaft or shaft shoulders may result from careless handling or removing tools.
If dirt or metal chips are allowed to get into the bearing they may cause damage to the load carrying surfaces when pressure is applied to removing tools.

After the bearing has been removed from the shaft it should be placed in a clean receptacle which is constructed so as to prevent dust, dirt or any foreign particles from getting into the grease or bearing. This may be accomplished by wrapping the bearing in paper.

A bearing should not be rotated or spun until it has been thoroughly cleaned.

Contractor "Mobilized"

Emergency fleet designed to "keep 'em rolling"

Mobility is good for the army, and in the times ahead is likely to be good for the contractor. Pacific Electrical & Mechanical Co., Inc., of San Francisco has been "mobilized" and is on war footing with a fleet of three shops-on-wheels and a pickup or "scout" car. This fleet is not its heavy construction contracting flotilla. Rather it is its repair, service, jobbing and emergency trouble-shooting fleet, available on 24-hr.-a-day basis as a particular branch of its business.

This specialty, which has been a year and a half in building up by Tom Bennett, manager of the electrical department, is a natural outgrowth of an organization affiliated with building maintenance (The American Building Maintenance Co.) on a large jobbing scale. The same careful management of details to make building maintenance pay out is necessary in such an electrical maintenance department. It must be run so that it can take care of small jobs from $1 up to the remodeling of an entire building.

Each truck is completely equipped with materials enough for a week's work. It has all necessary tools. Travel and rubber can be conserved by having it so stocked: so can time, a high cost commodity. The men who operate these trucks have been especially picked and trained men, long with the company, expert trouble shooters, capable of getting on and off the job efficiently.

Fixture hanging on a quantity basis, maintenance work for gas and oil service stations, repairs and trouble shooting are the kind of work on which these trucks are used exclusively and the business along these lines, with new civilian construction on the shelf, is being developed as an important branch of this contracting business.

Pacific Electrical & Mechanical Co.'s service and trouble-shooting fleet is available 24 hours a day. These shops-on-wheels have put the company on a wartime footing

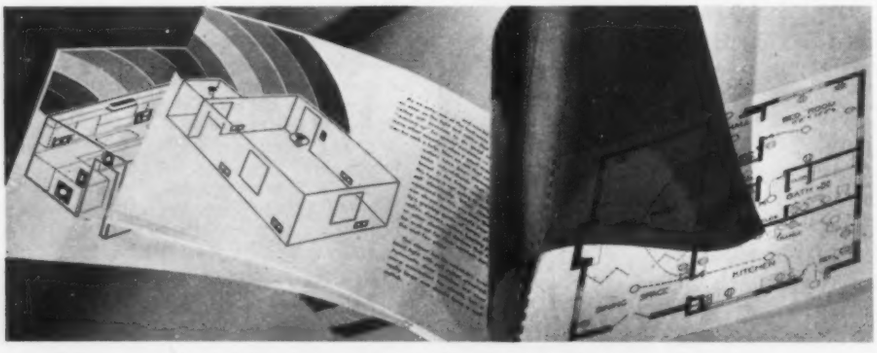
Wartime Wiring

Check Your Wiring for Wartime Service is the title of a folder issued by the National Adequate Wiring Bureau, as the nucleus of a consumer educational program keyed to present shortages.

Printed in red and blue to command attention and enlivened by a "quiz" type layout with cartoon illustrations, the folder is a practical means of making householders "wiring wise" and helping them to get better service from present installations. By teaching consumers to understand and to avoid difficulties arising from overloaded circuits, the NAWB program is building appreciation of the need for adequate home wiring and the desire to secure improved installations after the war.

The booklet (which sells to local groups at 1c each on minimum orders of 100 copies) tells in simple language: correct size circuit protective devices; current-carrying capacities of branch circuits; how to locate outlets served by each circuit; how to determine "overloading"; what to do when a fuse "blows".

To assist local groups in using the program, the bureau has prepared Service Bulletin No. 6, containing suggestions for using the educational folder and a draft of a home circuit survey for local adaptation.



Another NAWB aid to keeping householders informed on wiring adequacy is this visual manual of minimum standards. The 42-page book contains a graphic room-by-room presentation. In the introduction, "Your Home", presented as an animated cartoon, visits "Queer" and "Quality" Streets and decides to move into the latter. The way to accomplish this is shown by a small home floor plan, viewed first through a transparent overlay to reveal the barest electrical needs, then completely wired

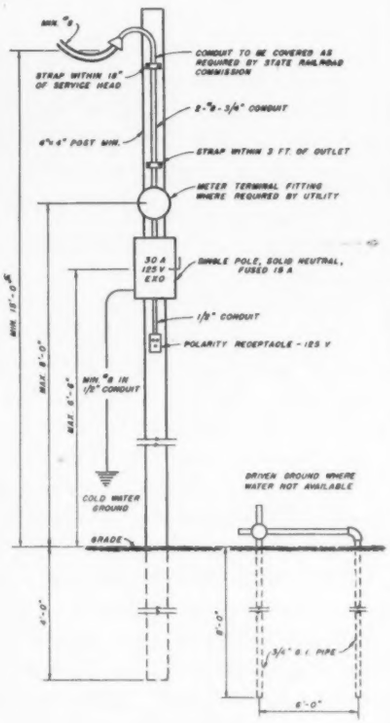
● AIR CONDITIONING FOR HOUSES IN CALIFORNIA is the title of Circular 351 published by the University of California Agricultural Experiment Station. Prepared by Hayden C. Gordon and R. L. Perry of the experiment station, the publication is the sixteenth of a series reporting results of investigations conducted by the station in cooperation with the California Committee on the Relations of Electricity to Agriculture. Subject matter has been separated into four general divisions, which concern (1) the physiological principles of air conditioning and the optimum conditions desired; (2) the loads and requirements to be satisfied; (3) various methods of completely or partially achieving the desired conditions—how to minimize the demands upon the equipment; (4) how to select equipment that will satisfy as many of the remaining demands as the homeowner wishes. This circular supersedes Bulletin 589, released in 1935.

● WHEN DOES A TRAILER cease to be a trailer and become a house? This question could be dismissed by electrical inspectors if there were no accident hazard, but with large numbers of families living in the crowded quarters of trailers in war industry centers, it is no mere academic question. Tire shortages have caused the wheels to be taken off many trailers, and thus trailers become houses. Wiring in most trailers was not designed to carry as much as 37 amp. of lighting and appliances, loads found to be served by a type C cord. Provision for grounding seldom is made. Tests in many indicate wiring to be shorted to the frame, and where children play about them, these are a real danger to life.

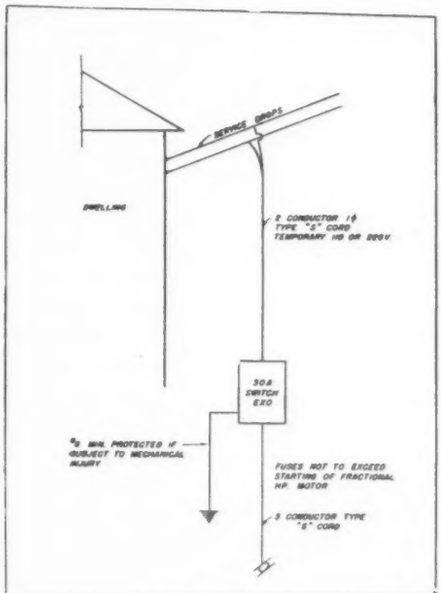
Temporary power for hand tools used in

Construction

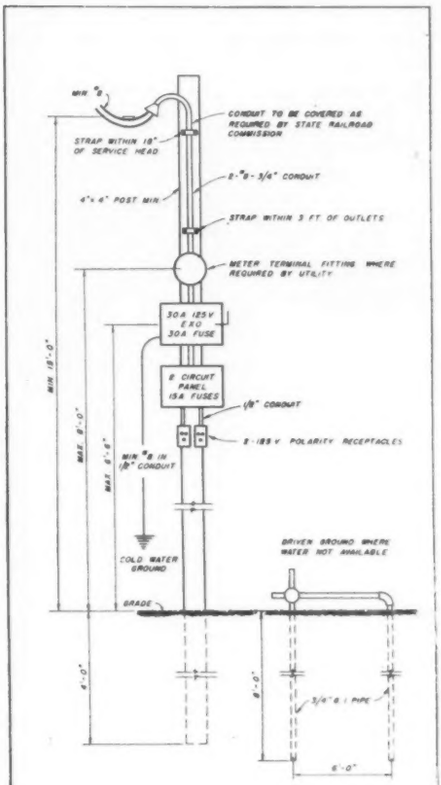
For handy reference, typical wiring diagrams which meet the minimum requirements of National Electrical Code and California Industrial Accident Commission Safety Orders, yet applicable throughout all of the Western States


CONDUIT TO BE COVERED AS REQUIRED BY STATE RAILROAD COMMISSION
STRAP WITHIN 18" OF SERVICE HEAD
4"x4" POST MIN.
STRAP WITHIN 3 FT. OF OUTLET
METER TERMINAL FITTING WHERE REQUIRED BY UTILITY
30 A 125 V EXO
SINGLE POLE, SOLID NEUTRAL, FUSED 15 A
1/2" CONDUIT
POLARITY RECEPTACLE - 125 V
MIN. #8 IN 1/2" CONDUIT
COLD WATER GROUND
DRIVEN GROUND WHERE WATER NOT AVAILABLE
GRADE
3/4" G. I. PIPE
6'-0"

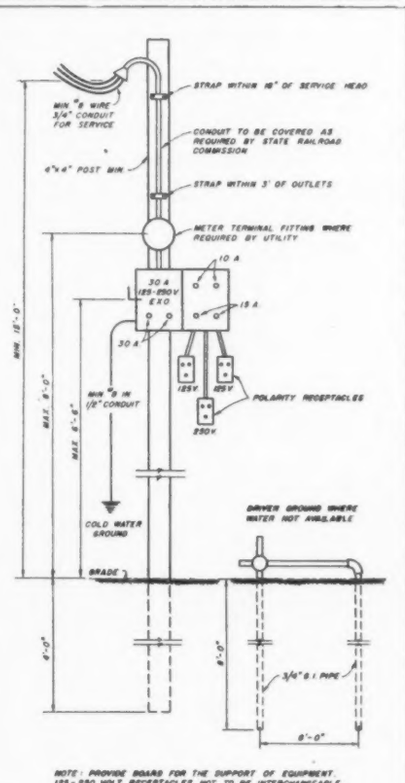
SINGLE CIRCUIT TEMPORARY POLE INSTALLATION
2 WIRE SERVICE FOR PORTABLE TOOLS


SERVICE DROPS
DWELLING
2 CONDUCTOR 1Φ TYPE "S" CORD TEMPORARY 115 OR 230 V.
30 A SWITCH EXO
#8 MIN. PROTECTED IF SUBJECT TO MECHANICAL INJURY
FUSES NOT TO EXCEED STARTING OF FRACTIONAL HP. MOTOR
3 CONDUCTOR TYPE "S" CORD

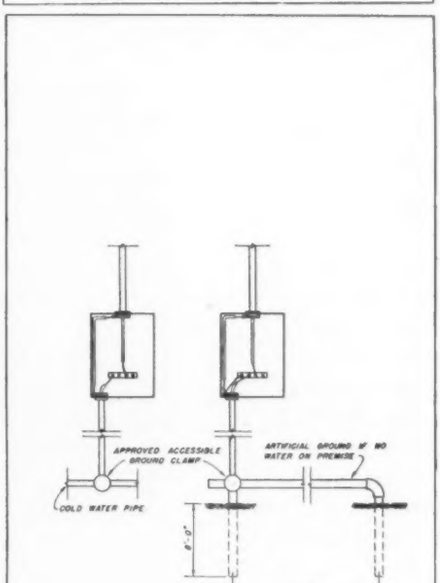
TEMPORARY SERVICE FROM NEIGHBORING BUILDING
FOR PORTABLE TOOLS, SINGLE CIRCUIT


CONDUIT TO BE COVERED AS REQUIRED BY STATE RAILROAD COMMISSION
STRAP WITHIN 18" OF SERVICE HEAD
4"x4" POST MIN.
STRAP WITHIN 3 FT. OF OUTLETS
METER TERMINAL FITTING WHERE REQUIRED BY UTILITY
30 A 125 V EXO 30 A FUSE
2 CIRCUIT PANEL 15 A FUSES
1/2" CONDUIT
2 - 125 V. POLARITY RECEPTACLES
MIN. #8 IN 1/2" CONDUIT
COLD WATER GROUND
DRIVEN GROUND WHERE WATER NOT AVAILABLE
GRADE
3/4" G. I. PIPE
6'-0"

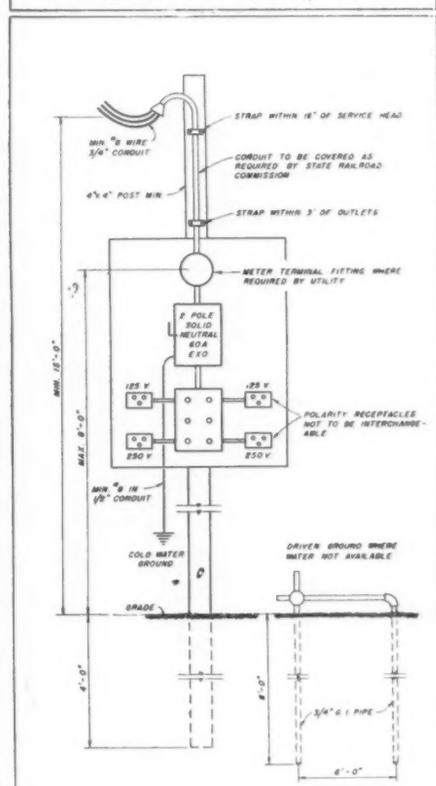
TWO CIRCUIT TEMPORARY POLE INSTALLATION
2 WIRE SERVICE FOR PORTABLE TOOLS


STRAP WITHIN 18" OF SERVICE HEAD
MIN. #8 WIRE 3/4" CONDUIT FOR SERVICE
CONDUIT TO BE COVERED AS REQUIRED BY STATE RAILROAD COMMISSION
4"x4" POST MIN.
STRAP WITHIN 3' OF OUTLETS
METER TERMINAL FITTING WHERE REQUIRED BY UTILITY
30 A 125-250 V EXO
10 A.
15 A.
30 A.
125 V.
125 V.
250 V.
POLARITY RECEPTACLES
MIN. #8 IN 1/2" CONDUIT
COLD WATER GROUND
DRIVEN GROUND WHERE WATER NOT AVAILABLE
GRADE
3/4" G. I. PIPE
6'-0"
NOTE: PROVIDE BOARD FOR THE SUPPORT OF EQUIPMENT.
125 - 250 VOLT RECEPTACLES NOT TO BE INTERCHANGEABLE.

THREE CIRCUIT TEMPORARY POLE INSTALLATION
2-125 V. RECEPTACLES & 1-250 V. RECEPTACLE



TYPICAL GROUNDING
FOR PORTABLE INSTALLATION


STRAP WITHIN 18" OF SERVICE HEAD
MIN. #8 WIRE 3/4" CONDUIT
CONDUIT TO BE COVERED AS REQUIRED BY STATE RAILROAD COMMISSION
4"x4" POST MIN.
STRAP WITHIN 3' OF OUTLETS
METER TERMINAL FITTING WHERE REQUIRED BY UTILITY
2 POLE SOLID NEUTRAL 60 A EXO
125 V.
125 V.
250 V.
250 V.
POLARITY RECEPTACLES NOT TO BE INTERCHANGEABLE
MIN. #8 IN 1/2" CONDUIT
COLD WATER GROUND
DRIVEN GROUND WHERE WATER NOT AVAILABLE
GRADE
3/4" G. I. PIPE
6'-0"

125-250 V. 3 WIRE TEMPORARY POLE INSTALLATION
FOR PORTABLE TOOLS

Prepared by a committee of the Southern California Chapter, IAEI

ELECTRICAL WEST

McGRAW-HILL COMPANY OF CALIFORNIA
68 POST ST. SAN FRANCISCO

The all-industry magazine of progress, established 1887 and incorporating the "Electrical Journal," "Journal of Electricity, Power & Gas" and "Journal of Electricity." Contents Copyrighted

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Time to Blackout Politics

A LOT of Congressmen are leaving Washington "to go home and find out what the people are thinking about." This is a good omen, because there have been too many so-called representatives of the people who have been anything else but that. Some Western legislators are going to be surprised by what they learn. One of the principal lessons is that the public is fed up with political shenanigans, log-rolling, pork barrel raids and social progress. The people want something done about winning the war quickly and completely and they expect less toadying to this or that special interest or vocal minority.

Many competent judges of public opinion say that the people are becoming increasingly full of doubts about their leadership. These doubts are based upon skepticism and cynicism that has grown with each new failure on the part of these leaders to throw politics overboard for the duration and to concentrate upon the problems of the war. Two or three glaring examples can be cited. One was the "deal" between proponents of the Florida barge canal and the backers of the alcohol process for making a rubber substitute. These are two shameful and costly measures cloaked in the masquerade of wartime necessity. Another is the Bone bill to foist bureaucratic ownership and dictation of the electric power industry upon the Pacific Northwest. None of this legislation will add a single tank, airplane, gun or ship to the war effort. All of it smacks of the kind of thing which destroys public confidence in political office-holders and the democratic system.

Maybe some of the homecoming Congressmen will learn some of these facts. If they do, the people can expect a Washington blackout against all things not contributing to winning the war.

Plight of the Agent

WESTERN manufacturers' agents, many of whom have been hard hit by the war, will find themselves in truly desperate circumstances if a bill now before Congress passes. H.R. 7304 headed "A Bill Prohibiting the Payment of Contingent Fees for Services in Connection with the Procurement of Naval Contracts," would preclude the payment of normal and legitimate commissions to a manufacturers' agent, representative, factor or broker on equipment or apparatus sold to the Navy. The legislation was designed to correct the flagrant abuses in fee collection by various individuals in Washington who have "contacts" or "influence" in the right places. However, as written it would seriously affect, if not completely wipe out, a large and important link in the chain of distribution.

In some sections of the U. S. and particularly here in the Far West the manufacturers' representative or agent performs a highly important distribution function. For the small manufacturer who cannot cover the country with salaried salesmen or who cannot maintain branch offices, the agent or representative fills the gap. By serving a group of manufacturers, he economically serves producer and customer alike. Without him, business and industry would suffer a real loss. He pioneers products and develops markets and in addition helps to reduce the price of goods to the ultimate consumer.

As has been said, the agent has suffered as a result of the war. Hardest hit have been those representatives of appliance manufacturers whose business has been cut right out from under them. With no opportunity to convert to war lines, they have liquidated for the duration, contracted their operations to the barest minimum or have looked to new fields for products. However, the agents of many companies which of themselves have not been affected also are suffering. Much war business is placed direct, or through Washington or some other Eastern center. The drastic reduction in building has hurt too.

Now to have legislation such as that proposed definitely close the door to profitable operation is almost the last straw. Not only should the agents, as well as the principals whom they represent, work to have this bill amended, but the manu-

facturers themselves might consider ways and means of giving some relief to the agents. It would be unfortunate for a group who has filled an important economic need to be liquidated because of the war.

Time to Standardize

ONE of the products of victory in the war is going to be a tremendous upsurge in electrical usage in American homes. This will be the result of pent up demand coupled with the countless new and better appliances that will come out of the industry's research laboratories. It is not too early now to begin thinking about conditions when the war is over. This present interval when there are no goods to be sold and when appliance factories are dedicated to production of war goods can be used to correct some of the abuses that have retarded customer usage and customer acceptance.

If we can be pardoned for harping upon a subject that has been discussed frequently in these columns, we would suggest that right now is the time to settle the question of water heater standardization. The elimination of all of the special requirements which have forced manufacturers to produce from 600 to 800 different water heater models can be accomplished now without any customer reaction or interference with any individual sales story or strategy. No specific type or sizes of heaters are being advertised or promoted. When the war is over, all efforts can be put back of the standard types developed through joint efforts of NEMA and the EEI.

Everybody from manufacturer to customer would benefit from general acceptance and adoption of these standards. Specifically the utilities and the dealers would secure the advantages accruing from increased turnover and from elimination of slow-moving stock. Overhead and handling charges would be decreased as would the capital invested in stock and repair parts. And sales effort could be concentrated on fewer models. The manufacturer would have less capital tied up in stocks. He could employ mass production methods, simplifying inspection, equipment and stocks. Production could be planned to provide permanent employment for workmen. Deliveries could be speeded up. There would be less obsolete material But the customer would be the ultimate beneficiary. He would be assured better quality products, better service and better values due to mass production technique.

Some Western power companies have adopted the standards. But there are too many who have not. Until they do neither the industry nor the public can profit from the benefits of standardization.

Public Contact Losses

ONE casualty of the war, as analyzed by Ashley Collins of Reddy Kilowatt, has been some 375 million sales contacts a year; one to every man, woman and child in the United States, even if that figure be discounted by two-thirds. His estimate is based on 50,000 electrical stores or outlets for appliances with an average three salesmen per outlet, 10 contacts per day, 250 working days per year. Now these contacts are no longer being made and public relations are bound to suffer. If anything, in a time like this, they are more needed than ever. As Alfred Cooper emphasizes in an article in this issue, employees need to be trained to overcome this loss. And human advertising must also play its part.

THIS proposed legislation (the Bone Bill) would amend the present Bonneville Act so as to confer broad power upon a Columbia Power Administration under the domination of the Secretary of the Interior. It could eliminate all privately owned utilities in the region through acquisition by the government and later sale to local municipal agencies which might be created. This would be accomplished without a vote of the people and by the exercise of condemnation authority. Under the authority, utility properties could be condemned by the administrator and immediate possession taken, leaving the determination of price to be paid to future court action. Properties could be dismembered by the taking of relatively small but vital parts, thus greatly reducing the bargaining value of the remainder . . . Under the provisions of the bill the Secretary of the Treasury is authorized to use the money obtained from patriotic purchases of war bonds and stamps for the purpose of bringing about socialization of the power industry in the Northwest. No additional kilowatts would be created to build additional tanks or guns or airplanes. The money would be used not to aid the war effort even in the slighest degree, but only to change the ownership of the utility property acquired. Altogether this is a most amazing and shocking attempt to disregard the rights of private enterprise, to make possible the destruction of private property values, to force upon an unwilling electorate public ownership and to destroy local home rule. —Z. E. Merrill, president, Mountain States Power Company.

Inspector's Life Is Not a Happy One

Wartime restrictions on materials will be studied by annual meetings of inspectors at Portland and Fresno

An electrical inspector's life hasn't been made any simpler by the war. Quite the reverse. All the safety standards which experience and practice have developed as necessary are being pushed back against the wall by the increasingly more severe restrictions on wire and wiring materials manufacture. The inspector is torn between his loyalty to safe practice and to his country in its need for critical materials. He has a difficult time keeping up with, or down to, the newest demands made on him to accept substitutes.

Reasoning thus, the Southwestern Section, International Assn. of Electrical Inspectors will go ahead vigorously with plans for its customary annual meeting, this year at Fresno, Sept. 21-23. But its program will be tailor-made to present-day conditions and difficulties, according to Clifford Prud'homme, president, and Harold L. Gerber, secretary-treasurer and in charge of the program.

In brief, the program will contain the following subjects and discussions:

Monday, after preliminary business, a thorough discussion of systems in use due to the war emergency. Under this head will come a paper on "Plant Networks with Air-Cooled Transformers," a new technique, presented by a Westinghouse speaker; "Porcelain Wiring Device as Substitute for Steel," presented by a member of the porcelain manufacturers; "Non-metallic Wiring Systems," presented by a wire and cable manufacturer; "Threading Electric Metallic Tubing," discussed by a maker of such tools; "Busway Systems," by a speaker from the manufacturers of such systems.

Blackout and dimout will be presented to the luncheon meeting, to which the general public will be invited, by a speaker from the General Electric Lamp Dept.

In Monday afternoon's session, spokesmen from branches of the industry will be heard—the electric utility—the union—and the Pacific Coast Electrical Assn., the latter on behalf of the uniform ordinance.

Tuesday morning, after a customary code breakfast, will be devoted to a discussion of the interim amendments to the National Electrical Code, by Victor H. Tousley, secretary of IAEI, and field engineer, National Fire Protection Assn. IAEI President William Gaffney will be heard with his presidential report, on Monday.

Wednesday morning, the session will be given over to discussion of the 1940 Code changes proposed and issued in pamphlet form by the IAEI for consideration. Final business, election of officers, etc., will conclude the meeting at noon. Much more time will be afforded inspectors for discussion of their problems and interpretations, it is planned.

Entertainment will be simplified but will consist of the usual Tuesday evening dinner-dance, a golf tournament perhaps, and a tea for the ladies Monday afternoon. An exhibit of manufacturers will also be staged, with emphasis on substitute materials and wiring methods.

C. H. Fowler, Fresno's electrical inspector, has been appointed general convention chairman. On his staff are the following committeemen: *Reception*, George W. Hayden; *information and registration*, D. W. Haire; *hotel*, A. S. Henderson; *publicity*, W. A. Cyr; *photograph and badges*, D. A. Demanty; *transportation*, R. V. Jones; *social*, J. M. Buswell; *program*, Harold Gerber; *finance*, Harold Gerber; *attendance*, H. G. Ufer, Harold Gerber, W. Kennedy Bliss and J. R. Lazarus.

Entire meeting of the Central California Chapter, at Fresno, June 26, was devoted to plans for the annual meeting. However, one additional item of interest was the reading of a letter from the California State Division of Housing, recommending the maintenance of inspection departments, and if necessary, that the cost be carried in the general budget of the cities if permit fees were inadequate to continue their support.

Northwesterners

Adaptation of the N.E.C. to war conditions and the functioning of electrical inspection departments in wartime will be the theme of the 16th annual meeting of the Northwestern Section, IAEI to be held at the Portland Hotel, in Portland, Sept. 17-18. Preliminary program, just received from F. D. Weber, secretary-treasurer, indicates two full days of reports and addresses, one Code breakfast, the usual annual dinner dance, golf tournament and a sightseeing trip for those staying over until Saturday, Sept. 19.

William L. Gaffney, chief electrical inspector of Tacoma, doubling this year as president of the International association and of the Northwestern Section, will preside. Berkeley Snow, executive secretary, Northwest Electric Light & Power Assn., is general convention chairman, and has announced that his sub-committees, formed from the membership of the Portland Electric Club, have the entertainment and arrangements well in hand.

Beside reports of standing committees and the usual business of the annual meeting, a number of special features appear on the program. Walter E. Potter, division engineer, Lamp Dept., General Electric Co., will present a demonstration and show entitled *High Lights and Blackouts* at an evening meeting, Sept. 17. Directly bearing on the war will be two talks by Victor H. Tousley, secretary-treasurer of the IAEI, one on protective lighting and one on the National Electrical Code and the war.

Emergency alternate specifications as applied to substitute electrical material will be discussed by H. G. Ufer, western superintendent of Underwriters Laboratories, Inc. New developments in equipment will be presented by James S. Mahan, representing Fustat Manufacturers on the new type "S" fuse, and V. B. Wilfley, engineering and service department, Westinghouse Electric & Mfg. Co., on the Westinghouse Type ASL-AVR air-cooled transformers.

● Ray J. Larrabee, field engineer, Underwriters Laboratories, Inc., has been appointed acting resident engineer for the duration at the Seattle office of UL, filling the place made vacant by the death of E. G. S. Pryor, according to Howard Dodge, electrical engineer. Office, too, has been moved to 1118 Alaska Building. Formerly offices were maintained with the Washington Survey Bureau. Larrabee, working out of San Francisco laboratory, operated the mobile field laboratory of Underwriters, covering the entire West. Tire restrictions, gasoline rationing, and difficulty in obtaining field samples decided UL to store its three field laboratories for the duration.

● L. A. Barley, chief engineer, Mountain States Inspection Bureau, Denver, retired recently because of ill health. Reports from El Paso, Texas, to which he went, tell that his health has improved greatly. Barley was active in inspector association affairs, and was a member of the IAEI executive council.

AIEE at Vancouver

Practical aspects to fill five session program

With a program geared to the successful prosecution of the war effort in both the US and Canada, the annual Pacific Coast convention of the AIEE scheduled for Vancouver Sept. 9-11, will be devoted to practical rather than theoretical aspects of engineering. Headquarters will be in the Hotel Vancouver.

Tentative plans call for five technical sessions devoted to system operation, system planning, apparatus (2) and industrial applications respectively. In addition to the customary student sessions there is some likelihood of a special wartime conference session.

NECA on the March

Swinging the length of the Pacific Coast states, W. J. Varley, field representative for National Electrical Contractors Assn. last month started new chapters, revitalized former chapters, brought energetic and personal field service to old chapters. As the month started he was planning another swing through Idaho, Utah and Colorado en route to the NECA convention, Aug. 31-Sept. 4, at Toronto, Canada.

In San Diego a new chapter was started, July 6, James Barry, elected president, Bruno Barth, San Diego Electric, vice-president and V. T. Heinz, Ace Electric, secretary-treasurer. Los Angeles chapter has been revitalized and its membership increased. Due to illness, its secretary, J. J. Newitt, was being given the assistance of Warren Penn as executive secretary. Penn originated the Gold Seal Industries wiring program with the Glendale association in 1940 (See ELECTRICAL WEST, Sept. 1940, p. 40.)

Seattle chapter, with Louis Bennedetti, Industrial Electric Co., president, Russell Horning, secretary, met at Washington Athletic Club July 9. Contractors doing large important war jobs in the Northwest were in attendance.

In Spokane (whose chapter is distinguished by having as a member Eric Johnston, of Brown-Johnston Electric Co., this year president of the U. S. Chamber of Commerce) the meeting was held at Desert Inn July 10. E. B. D. Fayter, Power City Electric Co., is president, Paul Heydon, secretary. While there, Corporal Herbert Strom, formerly of Strom & Smith, San Francisco contractors, was a guest. Spokane contracting firms of Tinling & Powell and Brown-Johnston are installing the big aluminum rolling mill plant electrical system.

Returning to San Francisco, Varley then had meetings with NECA members in Reno, Stockton, Sacramento and Fresno.

RMEL in the Scrap

Aggressive merchandising tactics of another era have been focused by the Rocky Mountain Electrical League on salvaging scrap metal for Uncle Sam's war machine. Under the vigorous promotional direction of George E. Lewis, RMEL manager (who got in touch with some 1,300 utilities in the Rocky Mountain region) steel and iron scrap totaling approximately 2,000,000 lbs. has been collected from power companies, telephone, water, gas and electric traction concerns. The campaign is still in progress, along with the rubber salvage drive, under supervision of the WPB, Industrial Salvage Division, of which Leslie Miller, former Wyoming governor, was regional head until the recent appointment of Malcolm H. Carpenter.

Close collaboration between the league's member companies, individual electrical dealers, contractors and others, is developing an interesting mass of information for final digest in RMEL's Customer Service Bureau guide. Already the missionary work incidental to compiling data has convinced customers that "all is not lost" because new electrical equipment cannot be purchased in the open market—that minor repairs, in many cases, will place valuable appliances in service for the duration.

Another important phase of league activity is the accounting section's study of, and reports on, new regulations emanating from Washington which affect utility accounting systems. A bulletin issued under date of July 2 analyzes war damage insurance, listing the various items of property which should be covered and those on which premiums can safely be eliminated.

● CLARK BAKER has been placed in charge of field activities of the Northern California Electrical Bureau for the emergency since the leave of absence of Walter Heston, who has joined the engineering staff of the Bechtel Shipyards. Management of the bureau is now in its executive committee; the office in charge of Jean Scott Frickelton; the office at 1355 Market St. in the Western Merchandise Mart. Baker is lighting counsellor for the bureau. Field activities include advisory service on lighting and wiring to builders, architects, maintenance engineers, commercial and industrial users, homemakers, and store personnel.

IES Elects

Fred J. Wellhouse, Westinghouse Electric & Mfg. Co., San Francisco, succeeds Frank Hansen, illuminating engineer, Office of Civilian Defense, as regional vice-president of Pacific Coast region, according to the announced results of the national ballot of the Illuminating Engineering Society.

John S. Walsh, Pacific Gas and Electric Co., was elected chairman, Guy deLeuze, Panama Lamp Co., secretary of the San Francisco Bay Cities Section, and on the board of managers are L. H. Brown, Stanford, W. E. Carlson, past chairman, General Electric Lamp Dept., R. G. Dummel, Holophane, N. H. Graves, P G and E, and K. K. Knopf, Westinghouse.

Urban L. Beh, General Electric Supply Corp., Los Angeles, was elected chairman of the Southern California Section, with Frank T. Anderson, Westinghouse, secretary. To the board of managers were elected R. J. Crump, Silvray, D. K. Grandey, L. H. Hruby,

● BONNEL W. CLARK, vice-president, in charge of sales, Westinghouse Electric & Mfg. Co., Pittsburgh, was to be the featured and only speaker at the Western Radio and Appliance Trade Dinner, Wednesday, Aug. 5, during the Western Fall Market at the Western Merchandise Mart. Charles A. Dostal, Pacific Coast district manager of Westinghouse, was to be the chairman of the dinner. Despite merchandise elimination for the duration, a large crowd of ex-appliance dealers and sales people was anticipated to hear Clark discuss *Appliance Problems of Today and Tomorrow.* Summation of his remarks and of those of Dr. Merle Fainsod, director of retail trade and services division, Office of Price Administration, Washington, D. C., on Tuesday evening, Aug. 4, will be reported in September. General Electric Lamp Dept., T. H. Shepard, Los Angeles Bureau Power & Light, and L. M. Watson, past chairman, Westinghouse.

Due to wartime limitations, Rocky Mountain Electrical League will not hold a convention in 1942. An executive committee meeting will be held in the fall, however, to select 1943 league officers and transact other business. Date of this fall executive meeting will be announced soon.

NEWA reports that its Pacific Division convention dates have been changed to Sept. 10 to 12. The meeting will be held at Del Monte, Calif.

"Copper and Kilowatts for Defense" was the presentation at the July 14 meeting of the San Diego Electric Club. A. B. Smedley, district manager of Anaconda Copper Co., illustrated this talk with animated charts.

PCEA Panorama — Edited by Mary Shoop

Electriquiz

Attention, operating men! Here is an Electriquiz prepared especially for your interest by I. W. Borda, Pacific Coast manager of the Okonite Co., San Francisco.

1. What two designations or measurements are made of electrical conductors in the United States?
2. Is it correct to refer to rubber insulating dielectrics as rubber insulation or compounds?
3. At what maximum operating voltage can insulated electric cables be furnished?
4. What two classes or qualities of natural raw rubber are generally used in rubber insulating compounds and how did each get its name?
5. What is the highest voltage at which current is being transmitted with rubber compound as the dielectric, and for how many years have such installations been operating successfully?
6. Of the so-called pressure type electric cables (a) what is the present maximum pressure under which they operate. (b) By what name is this type known?

Compare your answers with those on page 90.

Towns Adopting Code

Due to PCEA activities, more and more towns are adopting the 1941 edition of the Uniform Electrical Code and its Emergency Supplement Ordinance which takes care of WPB restrictions and returns the city to the regular code after the war.

King City, Pomona, Santa Ana, Corona, Sierra Madre, Blythe, Chino, Ontario, Martinez, Santa Monica, Gilroy and Hawthorne are included on the constantly growing list. Association representatives are working also with about 60 other cities and several counties, operating under previous editions of the code, to bring their code under emergency operation.

The association is issuing to all California cities, whether or not they have adopted the Uniform Electrical Code, filing cards informing them of interim revisions of the National Electrical Code and interpretations of WPB orders affecting wiring regulations. This is a valuable service which is building good will for the industry.

District Meetings

Long range planning aim of discussions

THE 1942 district meetings sponsored by PCEA will be the most important in the association's history. Providing needed facts and a long range perspective for members of one of the most important industries of a nation at war, they will be of great benefit to everyone in attendance.

The tentative schedule, expected to be completed between Sept. 21 and Oct. 9, includes meetings in:

San Jose, Oakland, Sacramento, Stockton, Fresno, Bakersfield, Pasadena, Long Beach, Montebello, Santa Monica, Riverside, Santa Ana and San Diego.

Transportation conditions have eliminated Reno, Chico and El Centro from this year's series. Located some distance from other towns, these cities have drawn attendance from widespread areas in the past.

Because of its advantages in presenting factual information, the quiz, so popular at last year's meetings, will be expanded this year to provide more time for the board of experts to answer questions submitted by members. Every person who attended a meeting last year has received a post card asking for questions. Other members, too, are invited to send them to either the San Francisco or Los Angeles office of PCEA by Aug. 15.

An up-to-the-minute report of industry conditions, indicating the industry's part in the war program, its outlook for the remainder of the war, and postwar prospects, will be presented at the northern meetings by R. G. Kenyon, assistant vice-president, Southern California Edison Co., Los Angeles, and at the southern meetings by A. C. Joy, advertising manager, Pacific Gas and Electric Co., San Francisco.

S. E. Gates, president of PCEA, will preside at all the meetings.

● PLANS FOR THE PCEA fall conclaves were made this month at meetings of the guidance committees of the three PCEA sections. The business development and administrative services sections met in Los Angeles on Thursday, Aug. 6. This was followed next day by a meeting of the operating economics section committee in Fresno.

Fresno will be the location of the conclaves, with the business development and administrative services sections holding their meetings on Oct. 22 and 23 at the Hotel Californian. Each section will meet separately for the major portion of the time, joining the other for a final assembly program of mutual interest.

Who Am I?

I was born Aug. 29, 1888, in Hayward, Calif. After attending grammar school there and high school in Oakland, I entered the University of California, being graduated in 1910 with a degree in electrical engineering. The next year I took a temporary job which has grown into a 31-year career with the Pacific Gas and Electric Co. and companies that merged with it. Who am I?

The temporary job was with the Merced River Electric Co. to dry out some generators that had been flooded. I remained as a power house operator. In 1917 the company became a part of the San Joaquin Light and Power Corp. I served as power house operator at Merced Falls and foreman at Merced before going to Atascadero in 1919 to install an electric distribution system. After being district manager at Los Banos for a short time, I went to Santa Maria in November of 1919 as superintendent of the Midland Counties Public Service Corp. In 1930 PG and E acquired the San Joaquin and Midland Counties systems, although the systems were not transferred until 1939. In 1934 I was appointed general superintendent of the San Joaquin and Midland properties, with headquarters in Fresno. I became general superintendent of the San Joaquin Power Division of PG and E, the position I now hold, when the San Joaquin and Midland systems were transferred in 1939. Who am I?

I am a member of the board of directors of the Pacific Coast Electrical Assn, a member of the Islam Temple of the Mystic Shrine in San Francisco, Eden Parlor of the Native Sons at Hayward and Hesperian Lodge of Masons in Santa Maria. I am a past president of the Fresno Kiwanis Club and a member of the Chamber of Commerce and Engineers Club. I am married, reside in Fresno and my name is: See page 90.

Tops personally, he and his staff are the nemesis of all incoming materials that do not measure up to Anaconda quality standards: they check them all.

In these critical days, no one can afford to make mistakes, no matter how trifling, in so vital a product as electrical wires and cables.

Relentless guard over the quality of products going into the manufacture of Anaconda wires and cables, is this "bogey man." He and his group of expert associates check every item against Anaconda's rigid specifications (tougher by far than those stipulated by government agencies), to the end that every wire and cable bearing the Anaconda name can be trusted for long, efficient, and economical service.

42244

ANACONDA
from mine to consumer

This familiar trade-mark symbolizes the best efforts of modern research and production.

GENERAL OFFICES: 25 Broadway, New York
CHICAGO OFFICE: 20 North Wacker Drive
Subsidiary of Anaconda Copper Mining Co.
Sales Offices in Principal Cities

ELECTRICAL WIRES AND CABLES OF COPPER ARE THE LIFE LINES OF OUR NATION

ANACONDA WIRE & CABLE COMPANY

NEWS of the industry

PGE-BONNEVILLE CONTRACT NEGOTIATIONS STALEMATED

After upward of two years intermittent negotiations between Portland General Electric Co. and the Bonneville Administration for a long term contract for the purchase of power from Bonneville, announcement was made through the Portland newspapers that negotiations had become stalemated and would be discontinued. Administrator Paul J. Raver stated that Bonneville will continue to serve Portland General Electric on a day to day basis with what power it can spare, as it has since the utility contract expired last Dec. 1. He would make no committment, however on the amount of power that might be available in the future over increasing demands of the war industries now served by Bonneville.

The company has used upward of 70,000 kw. of Bonneville capacity at times during the past few months.

Curtailment of the amount furnished the company by Bonneville would necessitate increasing use of the company's steam plants, which would tend to run up the cost of power particularly after consumption of available hog fuel made necessary the burning of oil.

The negotiations broke down on the provision requiring an option price for the purchase of the company's properties by Bonneville or its nominee. It had been agreed generally that such purchase would not have been consummated until Congress authorized Bonneville or a similar agency to make such a purchase, and until the people in a major area served by the company should approve public operation of the system. The option price, however, was the stickler. No prices were made public, but it was generally understood and published locally that the Bonneville offer was low, the price asked by Portland General Electric directors was next low, and the price insisted on by the independent trustees in the reorganization proceedings of Portland Electric Power Co., PGE's parent, was the highest.

The proposed option to purchase worked both ways. Bonneville, if authorized by Congress, could have required PGE to sell its entire system if the people in a major area under that system voted for public power, or PGE could, under the same set of circumstances, require Bonneville to buy the entire system upon demand.

Another sticking point that seemed to violate the "people's vote" provisions of the option part of the agreement was that Bonneville insisted PGE immediately sell portions of its system in Woodburn, Ore., and Clark County, Wash., to public agencies now existing. These properties are relatively small parcels of the whole and the company was unwilling to agree to sell them, stating that under regular condemnation procedure they could be acquired by those public bodies through the courts.

Editorial opinion in the Portland area and vicinity commenting on the breakdown of the negotiations called attention to the public interest involved that had not been adequately represented in the negotiations. This interest, as so expressed, deplored the thought that extraneous matters such as "options to buy" and the price therefore based on remote contingencies should have intruded themselves into the simple matter of securing an adequate and reasonable power supply for the area.

Eleventh Unit Installed At Boulder Power House

Boulder power house became unquestionably the largest hydroelectric generating plant in the world when the eleventh unit, an 82,500-kw. machine designated as A-2, went into service July 13. Total installed capacity was 869,800 kw. Two more such units are on order, A-5 scheduled for operation in November, and N-7, ordered last December.

The new Boulder addition brought total new installations of generating capacity in USBR projects in the West since June 30, 1941, up to 494,000 kw. Total generating capacity of the 28 hydro plants on 17 reclamation projects in the 11 Western states is now 1,447,926 kw.

Some time in 1945 Grand Coulee power house will supersede Boulder as the world's largest. Two 75,000-kw. Shasta machines being temporarily installed at Coulee will bring capacity to 494,000 kw. in November. Three more 108,000-kw. machines, units L-4, L-5 and L-6, are scheduled for completion in 1943. Three units will go into service in the right power house in 1944 and 1945.

● A STATE Water and Power Authority Bill, having the backing of Governor Osborn, has been drawn up for submission at the next session of the Arizona legislature.

A-I-A RATING CLEARS WAY FOR ROSS DAM ADDITION

According to notification given from Washington, by E. R. Hoffman, Seattle City Light superintendent, all priorities complications blocking City Light's Ross Dam addition have been cleared away, and the $8,300,000 project will go forward as originally planned.

The city council has announced that bids will be opened on Aug. 6 for construction contract to increase the height of the dam by 195 ft. in the middle, raising from elevation 1,360 to elevation 1,454.

Hoffman stated that the present A-1-A priority rating makes available all material required for the dam itself, and for the contractor's equipment and materials, and that it is now safe to let a contract.

The Seattle city council also has set the date of Aug. 12 for opening sealed proposals for the $7,900,000 of bonds that will be issued for the project. The additional $400,000 required will come from City Light's operating surplus.

Hoffman pointed out that the high priority obtained is proof of the importance attached by federal authorities to the necessity of obtaining more electrical energy for the ward production use. The dam enlargement originally was planned at the request of federal power authorities.

Principal quantities included in the contract are 94,000 cu.yds. of rock excavation, 1,100,000 lbs. of reinforcing steel and 385,000 cu.yds. of concrete. A timber crib raising 15 ft. above the existing dam must be removed before the new work can be started.

General DeWitt Orders Coastwide Dimout

A restricted lighting zone from Canada to Mexico extending inland in some cases 150 mi. has been ordered by Lieut. General J. L. DeWitt effective Aug. 20. The Civilian Defense Board and civil law enforcement agencies will enforce the order. Purpose is to protect movement of vessels along the seacoast and obscure target areas. All outdoor signs, ornamental lighting, amusement lighting and floodlighting must be extinguished. Illumination of all outdoor areas in the zone, including parking lots, service stations, etc., must not exceed one foot-candle. Show windows of normal intensity are not affected.

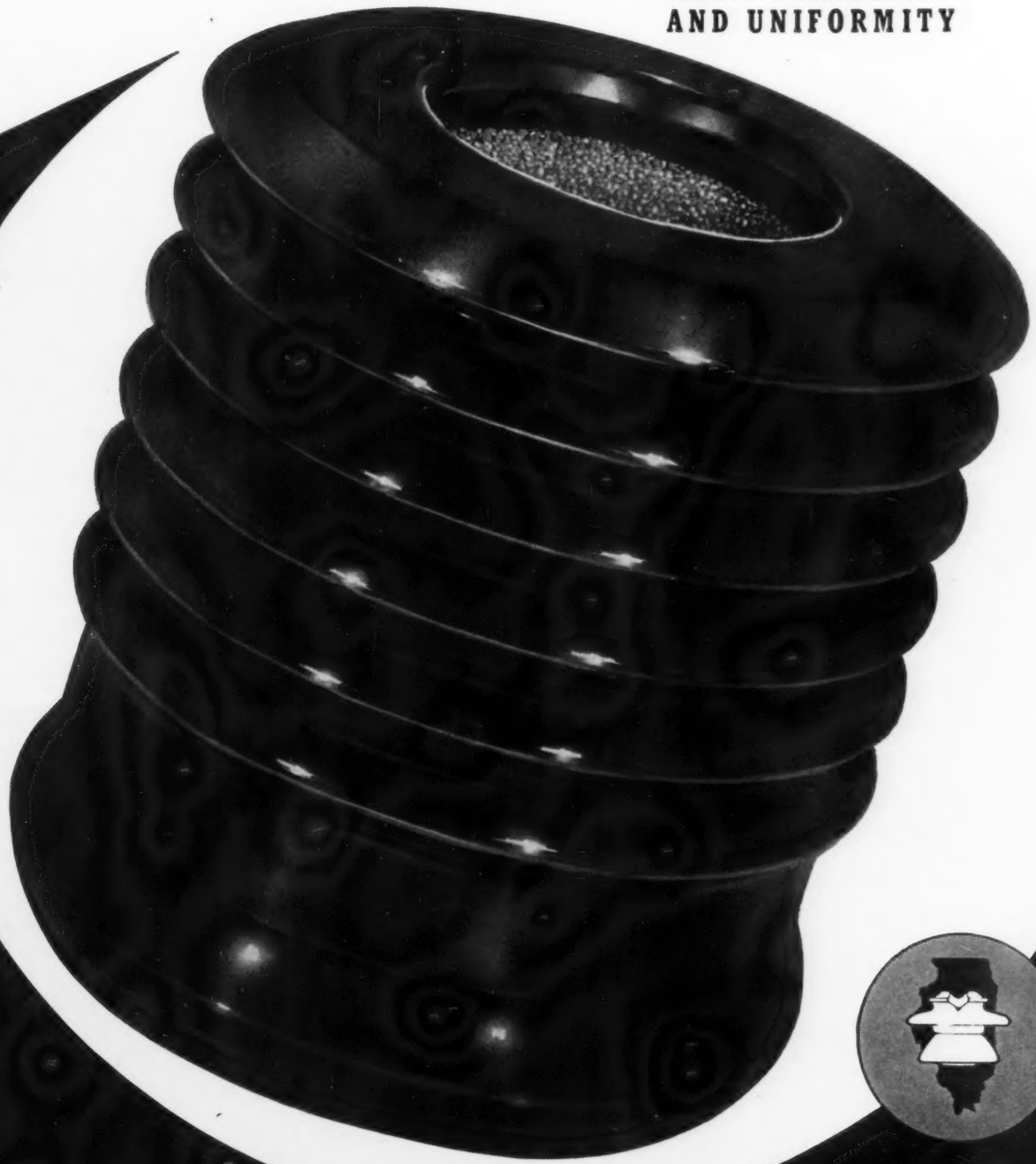
ILLINOIS

INDOOR BUS SUPPORT PORCELAINS

HIGH
DIELECTRIC STRENGTH

HIGH
MECHANICAL STRENGTH

EXACT DIMENSIONS
AND UNIFORMITY



ILLINOIS ELECTRIC PORCELAIN CO. MACOMB, ILLINOIS

Win the WAR ON WASTE

• Now is the time to wage war on waste. Food conservation—labor, fuel and energy can best be done the electric way.

Many users of Lang electric commercial cooking appliances tell us of their experiences in saving, speeding up operations and in turning out better quality meals. Lang construction assures long life and efficient operation. Lang automatic controls save time and effort of chefs.

Today, Lang is building for the army, navy and—Victory. These orders are the FIRST orders of the day. However, we can take care of our commercial customers, too.

We urge anyone considering the purchase of Lang electric equipment to plan ahead and order ahead.

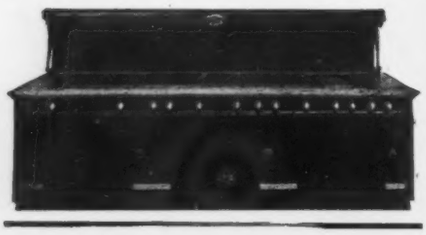
F. S. LANG MFG. CO.

Portland—Seattle—Spokane

Builders of

LANG

STANDARD AND CUSTOM-BUILT HEAVY DUTY ELECTRIC RANGES, COOKING TOPS, OVENS, GRIDDLES.



PACIFIC COAST UTILITIES WIN ADVERTISING AWARDS

Far Western power companies won their share of awards in the better copy contest conducted by the Public Utilities Advertising Assn. Results were announced at the annual convention of the association held late in June at New York and presided over by Al. C. Joy, Pacific Gas and Electric Co. advertising manager, who headed the organization in 1941-42.

Three first place national awards came westward—for the best residential customer bill enclosure to Southern California Edison Co. for its monthly pamphlet, *Electrical Times;* for the best motion picture, to Pacific Gas and Electric Co. for *Whirling Wheels*, an industrial film in color; and for the best gas merchandising advertisement to Pacific Gas and Electric Co. Puget Sound Power & Light Co. won third place in the national radio program competition for its series of daily and weekly broadcasts.

Regional winners of Pacific Coast awards for outstanding advertising in the various classifications judged were as follows:

Public Relations: Pacific Gas and Electric Co. for a wartime power ad.

Electric Loadbuilding: San Diego Gas & Electric Co. for a small appliance ad over the signature of the Bureau of Radio and Electrical Appliances.

Electrical Merchandise: San Diego Gas & Electric Co. for an ad featuring the butter conditioner on a General Electric refrigerator.

Gas Loadbuilding: British Columbia Electric Railway Co.

Utility Company Campaigns: Southern California Edison Co. for an electric range campaign.

Transportation: Southern Colorado Power Co.

Employee Magazines: San Diego Gas & Electric Co. *Newsmeter.*

Employee Newspapers: Puget Sound Power & Light Co. *Puget Power News.*

Residential Customer Direct Mail: Southern California Edison Co. campaign on evaporative coolers.

Industrial and Commercial Direct Mail: Southern California Edison Co. campaign on commercial cooking.

Booklets and Pamphlets: Puget Sound Power & Light Co. for booklet on *Electric Gardening.*

Window or Inside Displays: Puget Sound Power & Light Co. for Better Light window display.

Outdoor Advertising: Washington Water Power Co. for an electric range billboard featuring the Inland Empire Electrical Equipment Assn.

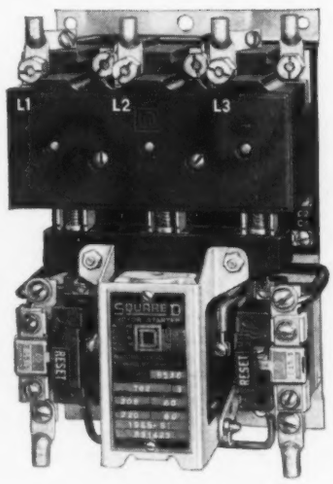
Annual Reports: Pacific Gas and Electric Co.

● The City Council of Grand Coulee, Wash., has granted to the U. S. Government a franchise for the immediate construction of two additional high-tension electrical lines to be carried by steel towers across the city's distribution system near the west city limits. Work is now under way on the 230-kv line which will carry current to Spokane for use in the aluminum industry.

With this window display in its Everett, Wash., office, Puget Sound Power & Light Co. captured the Public Utilities Advertising Assn. regional award for the classification. Pacific Coast utilities were well represented both in national and regional "Better Copy" prizes announced at the association's recent New York convention

Complete Accessibility

means faster, easier servicing of motor starters

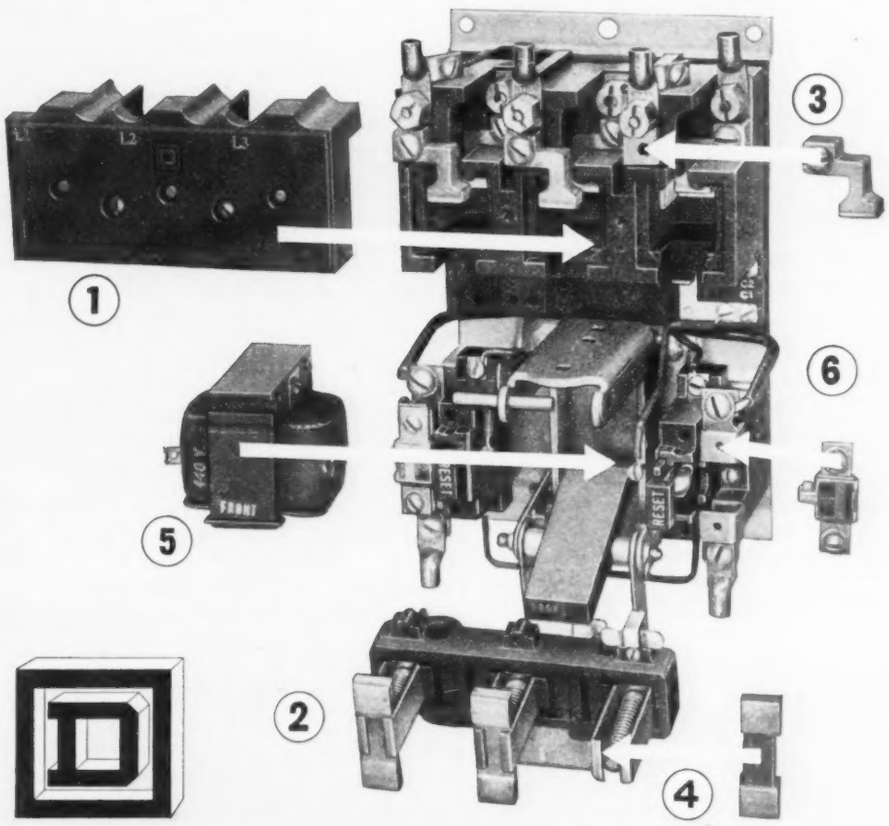


All renewable parts of Square D AC electric motor starters can be inspected or replaced in a matter of seconds—using only a screwdriver

Top operating efficiency and long life of electric motor starting equipment depend largely on regular inspection and occasional servicing.

Today—with every minute at a premium—this inspection and servicing job is more important than ever to avoid time-wasting breakdowns.

Square D Class 8536 AC magnetic starters, with their simple compact construction and vertical action, are completely accessible. An electrician, without special tools, can exchange magnet coils, contacts or overload relay units—in practically no time at all.



1 Both stationary and movable contacts are exposed for inspection by merely loosening two screws and removing the arc chamber cover.

2 With cover removed, movable contact yoke bar can be swung forward to uncover operating magnet and coil.

3 Each stationary contact is held in place by a single screw. Removal does not disturb line or load connections.

4 Movable contacts can be turned 90° and removed from retaining clips without tools. Movable as well as stationary contact tips are silver—require no cleaning or dressing.

5 With coil connections removed, magnet frame and coil are lifted out by sliding locking clips and retaining pin out of position.

6 Clearly marked melting alloy type thermal overload relay units—interchangeable to suit motor characteristics—are easily attached at either side of the starter. Heater, melting pot, and ratchet wheel comprise an integral unit. Repeated tripping causes no deterioration and no parts need to be renewed following overload.

WRITE FOR BULLETIN 8536

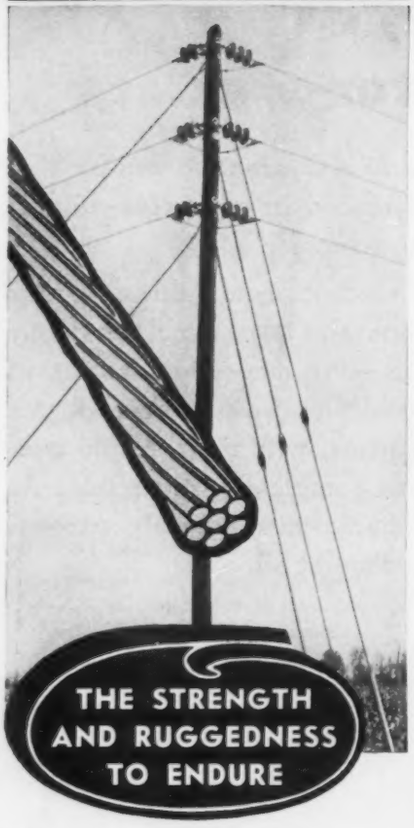
SQUARE D COMPANY

LOS ANGELES - DETROIT - MILWAUKEE

KOLLSMAN INSTRUMENT DIVISION, ELMHURST, NEW YORK

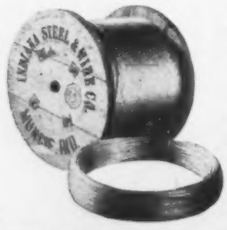
IN CANADA: SQUARE D COMPANY CANADA LIMITED, TORONTO, ONTARIO

Crapo
GALVANIZED STEEL
STRAND



STRENGTH to support the pole structure under maximum ice and wind loading ... RUGGEDNESS to withstand the punishment incurred in construction and service .... DURABILITY that outlasts the normal life of the line .... are combined---with important ECONOMY---in Crapo Galvanized Steel Strand.

Each size and grade develops the full tensile strength of the steel in cross section. The heavy, ductile, tightly-bonded zinc coating---applied by the famous Crapo Galvanizing Process---provides lasting protection against corrosion.



There is a size and grade of Crapo Galvanized Steel Strand for every practical need. Consult the distributor of Crapo Galvanized Products near you or write direct for further information!

INDIANA
STEEL & WIRE CO.
MUNCIE, INDIANA

$4,178,000 ALLOTMENT IS VOTED SHASTA PROJECT

Funds for the construction of a 220-kv. transmission line from Shasta Dam to Antioch, Calif., and for the Antioch steam plant, were included in the $178,099,712 Interior Department appropriation bill passed by Congress and signed by the President. A total of $4,178,000 was included of which $250,000 was for preliminary engineering work on the steam plant.

Initially the funds were voted out of the bill by the House of Representatives, but were later added by the Senate. The matter could not be settled in conference and the bill came back to the House for amendment. A letter from President Roosevelt to Speaker Rayburn, endorsing the appropriation, finally brought favorable House action.

PUD Secures War Contracts In Vancouver Area

Clark County PUD in Vancouver, Wash., has hired George Hibbert of the Bonneville Administration staff, as its acting manager. Hibbert, who has been connected with the power field for 30 years, resigned his post of Portland district manager for Bonneville.

The Clark County PUD has signed a supplementary contract calling for extension of PUD service to the $4,000,000 "war apartments" development on Battle Ground Highway, and to the second set of Kaiser shipyard dormitories. The PUD also has arranged to operate the Bonneville servicing system in Vancouver to supply service to the huge Kaiser shipyards.

● AGREEMENT between Portland General Electric Co., and the Federal Power Commission on reclassification of the company's property on the basis of original cost resulted in adjustments of the company's property account downward by $9,713,000. The FPC study had originally figured the reduction at $12,866,000. Of the amount to be written off in the adjustment, $8,153,000 applied to electric plant.

The agreement provided that approximately $7,700,000 would be written off immediately to surplus; the other $2,000,000 would be amortized over a period of 10 years at the rate of $200,000 a year.

● FOLLOWING AN ORDER from President Frank J. McLaughlin of the Puget Sound Power & Light Co., Seattle, that every item of rubber not vital for practical operation of the company be donated to the rubber-collection drive, more than 35,000 lbs. of scrap rubber were turned in through company channels—and the drive continues. Company cars and trucks provided 393 floor mats, and a combing of offices yielded floor strips, chair pads, desk mats and many other articles. Reflecting the attitude of the management that this was one of those cases where everybody could prove of real help in winning the war, company employees responded with enthusiasm.

Westinghouse To Enlarge Its Emeryville Plant

An expansion program scheduled at the Emeryville, Calif. plant of Westinghouse Electric & Mfg. Co. is expected to enable material enlargement of the company's production for war, according to Charles A. Dostal, Pacific Coast district manager.

Involving expenditure of several hundred thousand dollars, the program includes construction of a new building, realignment of equipment and facilities in present buildings and installation of additional equipment. When the expansion program is completed, a comparable increase in personnel is anticipated, the company states.

The new building, contract for which has been let to Barrett & Hilp, San Francisco, will house extensive service and repair facilities and a large box shop. To conserve steel this building will be largely of wood and glass construction, it is reported. It will include a main aisle in which heavier equipment can be handled and several small aisles extending the length of the building.

"The expansion program will give us greatly needed space for enlargement of our service and repair activities as well as equally necessary additional manufacturing area," Dostal said. "I feel that the Company's decision to spend this money here reflects not only its all-out local and national participation in the nation's war effort, but also its faith in the industrial and business future of the entire western district which is headquartered here. That district extends from the Rocky Mountains to the Pacific Coast, and from Canada to Mexico, and includes also Alaska and the Hawaiian Islands."

● MT. OSBORNE, huge pile of hogged fuel that has gained national attention, will provide 61,614 units or 12,322,800 cu.ft. of sawdust for the operation of Portland General Electric Co.'s 100,000-hp. Station L in Portland. On July 19, the pile was larger than at any time in its history, 10,000 units over last year's peak.

● UNDER A RULING from Attorney General Smith Troy, at Olympia, Wash., public utility districts can invest their surplus funds in U. S. Government war bonds the same as other corporations.

Lift the Film of "NIGHT BLINDNESS" from Industry!

In war plants all over the land MILLER Continuous Wireway Fluorescent Lighting System has raised the sights on production by lifting the level of illumination to 50 foot candles, 100 or higher . . .

99,000 out of 100,000 war plants have inadequate lighting for fast, precision production . . . according to the National Better Light Better Sight Bureau.

Inability to see clearly and sharply at all times can be just as tragic a liability to war workers as "Night Blindness" is to fighting pilots.

Today nothing less than ideal "seeing" conditions in your customers' plants, 24 hours around the clock, should satisfy you.

MILLER 50 FOOT CANDLER and 100 FOOT CANDLER will put 50 foot candles, 100 or better of man-made daylight on every working surface in their plants. MILLER TROFFERS will duplicate that performance in their plant offices and drafting rooms.

They will accomplish this at an economy and speed of installation that will pleasantly surprise even you.

The sooner you get a MILLER engineer at their plants to give them an analysis of *exactly* the working illumination they need today, the sooner they can get busy and beat their best war production promise. *Write or wire today.* (Representatives in principal cities.)

BUY U. S. WAR BONDS

MILLER
50 FOOT CANDLER
100 FOOT CANDLER
MILLER TROFFERS
Continuous Wireway Fluorescent Lighting Systems
THE MILLER COMPANY
MERIDEN, CONN.
Pioneers in Good Lighting Since 1844
• MILLER offers a complete line of filament and fluorescent lighting equipment.

First CHOICE IN ANCHORS

EVERSTICK

For dependable anchoring under all conditions, use Eversticks. Made of tough, rust-resistant, malleable iron . . . quick and easy to install . . . expand in undisturbed earth. Preferred by engineers and crews alike.

Write for latest Everstick bulletin.

EVERSTICK ANCHOR CO.
FAIRFIELD, IOWA

NO SPECIAL TOOLS ARE NEEDED TO INSTALL

BURNDY SCRULUGS

In the West It's

Condon & Young, Inc., 357 S. Hill St., Los Angeles, Calif.
C. E. Ingalls, Rialto Bldg., San Francisco, Calif.
Fred W. Carlson, 307 Wall St., Seattle, Wash.
Riter Engr., Kearns Bldg., Salt Lake City, Utah

BURNDY 107 EASTERN BLVD. NEW YORK CITY

NEW WPB RULING GOVERNS EXTENSION REQUESTS

A letter application is now all that is required of utilities seeking WPB power division approval and priorities aid for any extension project or enlargement of facilities to serve war loads rated A-5 or higher. It is no longer necessary nor proper to file either PD-200's or a series of PD-1A's for such jobs.

This change in procedure, applicable to practically all utility construction at this time except generating station additions, is traceable to the language in Sections B-1(iii) and E-2 of the revised P-46 order. The former gives the power division unlimited authority to assign the same rating to the utility extension that is held by the war job; the latter provision specifies the manner of filing the letter application and the pertinent data required.

The letter application is proper whether material for the extension is to be withdrawn from excess inventory or purchased, or both. The power division is authorized to act upon the facts presented in such an application and the "b" paragraph section of P-46 permits self-assignment of the necessary ratings by the utility. In addition to the information required in Section E-2, however, it is advisable to give WPB detailed information, including estimates in pounds, of the amounts of critical materials needed for the job as was formerly called for on the PD-200 applications, as well as most of the data sought in the old original application form outlined by Release T-36 (in effect through 1941 and early 1942). In other words, the power division still needs to know what materials are being used even though approval of the application can be issued automatically.

For all purchases of materials for extensions or facilities enlargement projects planned to serve loads which have an A-6 or lower rating, utilities still file on PD-1A applications. Proper practice remains to append a short but complete letter explaining what the project is, to supplement the specific data called for on the blank. PD-1A forms are NOT used, however, where material is to be withdrawn from excess inventory for these jobs; instead a letter application is used.

● WOMEN METER READERS have made their initial bow to the public of Victoria, several young women having been taken on to the staff of the B. C. Electric Railway Co. to replace men now serving with the armed forces.

These young women are undergoing a preliminary course of training and will, for a time, make their rounds under the supervision of an experienced meter reader.

Women meter readers already are employed in Vancouver and in other Canadian cities. They have been employed in Great Britain for some years and, according to reports, have proved most satisfactory.

PUD Gets Purchase Bid On $5,875,000 Bond Issue

Whatcom County PUD, Bellingham, Wash., has under consideration an offer from Ballard & Hassett, Des Moines, Iowa, for purchase of the district's $5,875,000 bond issue. If this offer is accepted, the district will enter the power business.

The proposal calls for issuance of $5,580,000 in revenue bonds and $380,000 in general obligation bonds (the limit the commissioners could issue without a vote of the people) making a total of $5,960,000, and allowing $85,000 for the investment firm's discount. It also specifies that the commissioners may place on the November general election ballot a proposition for the issuance of an additional $900,000 in general obligation bonds, making a total of $1,280,000, if the electors approve.

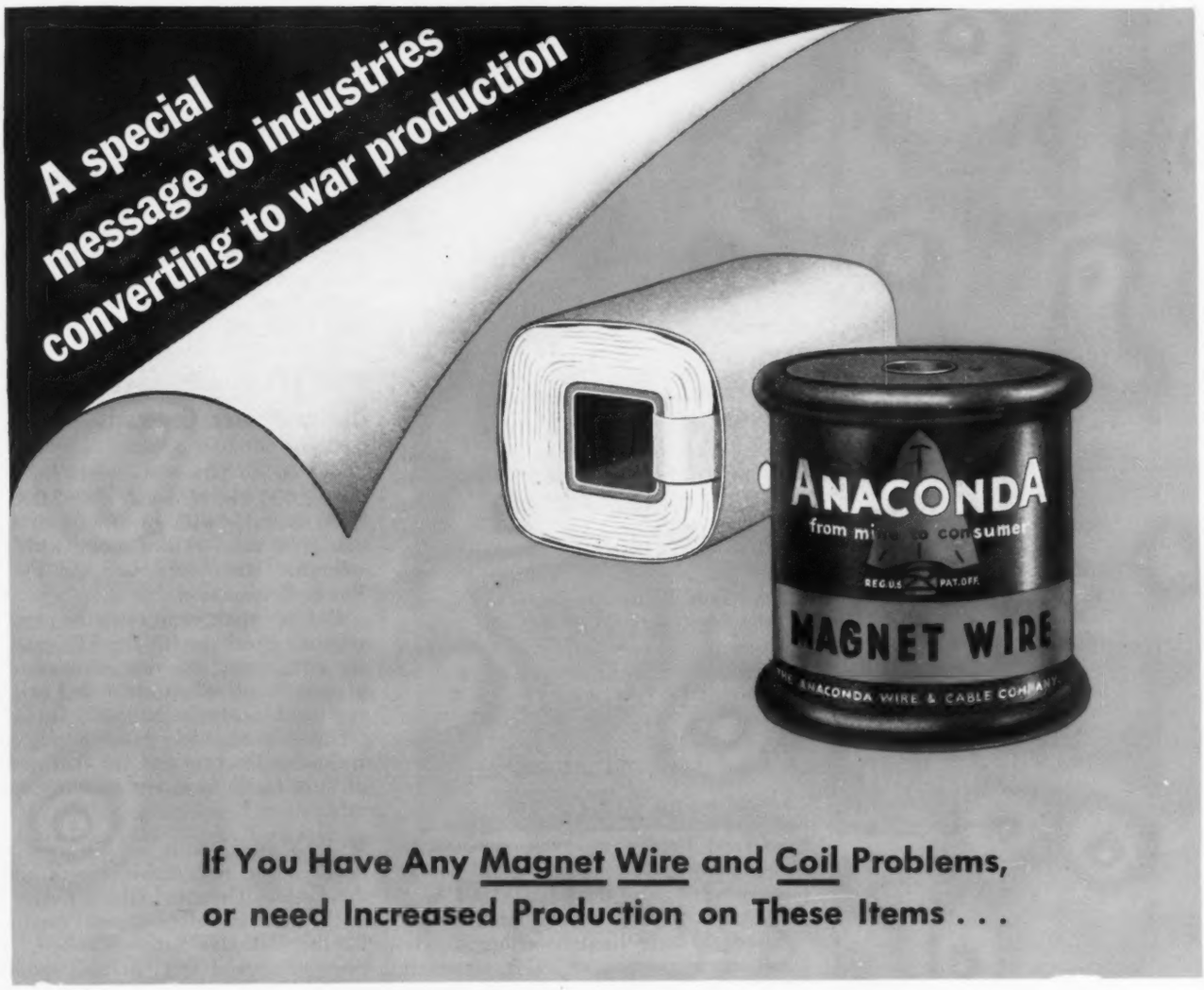
Interest rates payable by the district are listed on the revenue bonds at 3, 3¼, 3½ and 4%, governed by maturing dates, and on the general obligation bonds at 2%. The district would start retirement of the bonds at the end of the fourth year, with the final date of maturity the thirtieth year.

Mineral Laboratory Slated For Pacific Northwest

Economical development of mineral resources of the Pacific Northwest will receive further stimulation from a new $500,000 electro-development laboratory to be built by the U. S. Bureau of Mines within a 200-mile radius of the Bonneville and Grand Coulee power houses.

Some 40 to 50 metallurgists will study the recovery and processing of minerals with modern equipment which will include electric furnaces, electrolytic cells, and ore-crushing and concentrating machinery. In the past experiments on electrometallurgical treatment of Western minerals have been conducted at a USBM station at Boulder City.

● BIDS FOR STRUCTURAL STEEL for the transformer circuit structures for units L-1, L-2, L-4 and L-5 at the Grand Coulee Power House were taken by the USBR at Denver, on Aug. 5. The material carries an A-1-C priority rating.


A special message to industries converting to war production
ANACONDA
from mine to consumer
REG. U.S. PAT. OFF.
MAGNET WIRE
THE ANACONDA WIRE & CABLE COMPANY

If You Have Any Magnet Wire and Coil Problems, or need Increased Production on These Items . . .

Anaconda Can Help!...

Anaconda's Central West plants still have unfilled capacity on magnet wire and coil production . . . *for war work*. In addition to these facilities, they have experienced personnel to help solve problems you might have with this phase of manufacture.

Here is an opportunity to release your time so that it can be devoted to other important problems. Our sales offices, located in all principal cities, are near you. Call today. A representative will be glad to discuss your problem.

GENERAL OFFICES: 25 Broadway, New York City
CHICAGO OFFICE: 20 North Wacker Drive
Subsidiary of Anaconda Copper Mining Company
Sales Offices in Principal Cities

ANACONDA
from mine to consumer
This familiar trade-mark symbolizes the best efforts of modern research and production.

These Improved Insulations Are Now Available
Nylon—Vitrotex—and Formvar

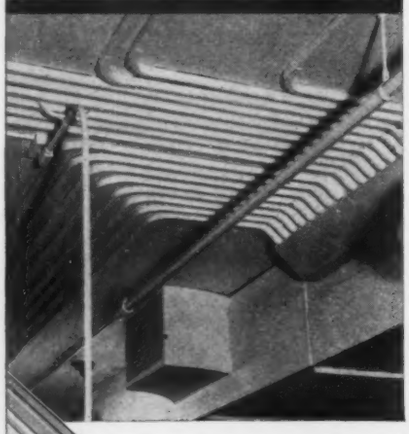
The commercial development of Nylon and Vitrotex insulations is in part the result of Anaconda research . . . research that continues with redoubled effort producing new products for war work. Of course, when peace comes, the benefits of this research will be ready for industry everywhere.

42262

magnet wire and coils

ANACONDA WIRE & CABLE COMPANY

WHETHER YOU ARE
Wiring
OR
Rewiring



SEE OUR CATALOG IN SWEET'S

● SAVE TIME
● CONSERVE MATERIAL
● DO THE JOB FASTER

Wiremold Surface Metal Raceway Systems can be extended or relocated quickly, at low cost. New circuits can be added or changes made in the location of outlets, switches, etc. without breaking into plaster or "fishing" old conduits.

Strong, safe Wiremold Surface Metal Raceway is readily inspectable, less subject to unnoticed deterioration, completely protected. Wiremold Raceways meet all Code and Underwriters' requirements yet compact, thin-wall construction conserves steel. Catalog and Wiring Guide on request.

WIREMOLD
WIRING for LIGHT...LIGHTING for WORK
• CATALOGS and BULLETINS on request •
THE WIREMOLD COMPANY, HARTFORD, CONN.

WPB ORDER PERMITS SALES FROM EXCESS INVENTORY

Utilities may now sell material from their excess inventories to other utilities who place with them an order carrying a P-46 rating of A-5 or higher or any other preference rating certificate from WPB. This is not a withdrawal from inventory as defined by the Section F limitation of P-46, but it is a delivery to the purchasing utility if the material is acquired for repair or maintenance; it is not a Section F delivery if the material is for a construction project. No advance approval from Washington is required.

Authority to make these sales is conveyed by an amendment to P-46 (amendment No. 2 to the order as amended to March 26), issued under the permission of Section C-2(iii) of Priorities Regulation No. 13. It is to be noted, also, that utilities upon whom purchase orders are placed are required to make the sale if they have the material in excess stocks, just as any distributor or manufacturer is required to accept rated orders placed with him.

Coulee Reservoir At Top Elevation In July

Grand Coulee reservoir reached its maximum elevation and peak storage capacity of more than 10,000,000 acre-ft. early in July when drum gates, raised to their limit, overflowed. Result was a spectacular 330-ft. waterfall, 1,650 ft. long. The lake is now 151 miles long and covers 102 sq. miles of area.

The filling of the reservoir can be accomplished several times each year; during June and July when river flow is at its maximum, in one month, at the average flow of the Columbia, in two months. Because of the large summer flow, no draw-down for irrigation will be necessary, resulting in a constant lake level during the summer vacation season. For this reason it is expected that a great recreational area will be created, supervised by the National Park Service under an agreement now being negotiated with the USBR.

New FPC Ruling Executed On Utility Power Contracts

All utility power contracts for more than 1,000 kw. of demand or 2,000,000 kwh. annually with governmental agencies must now be filed along with considerable other data with the Federal Power Commission.

For any changes in rates the new rule requires posting with the FPC at least 60 days prior to the effective data, giving the actual or estimated original cost and depreciation both for those facilities used solely in rendering service under the rate and for that portion of joint facilities as are allocable to the rate.

● TWO YEARS with no lost-time accidents is the remarkable record set by the Eastern Oregon Light & Power Co. in the national safety contest, conducted by the National Safety Council. Employees worked 193,278 man hours in the last 12 months with no lost-time accidents, according to B. F. Lentz, safety engineer.

Tire conservation at the Southern California Edison general store and warehouse yards is aided by a 2,000-lb. magnet, suspended six in. above ground at the rear of a heavy truck. Two gasolene motors operate a pair of generators, which send a constant flow of 220 volts through the magnet, exerting a 600-lb. pull. In a single day, a 50-gal. drum of junk, weighing 530 lbs. was secured from eight acres of Edison roads. A "magnetic run" over the employee parking lot, which appeared clear of sharp objects, netted 10 lbs. of nails

TRADE notes

● Fray Machine Tool Company, Glendale, Calif., which has been building all the motors for its own products for several years, has established the Frayco Electric Motors Co., for the exclusive manufacture of a complete line of motors from 1/3 hp. to 7¼ hp. This company will specialize in the production of motors with special end bells, for manufacturers of machine tools and other equipment in which they wish to streamline the motor into the product.

A new plant has been acquired at 1709 Standard Ave., Glendale, with 15.000 square feet of space. The Frayco Electric Motors Co. will be under the management of O. W. Weyman.

● George H. Curtiss, 540 McAlister St., San Francisco, has been appointed representative for northern California for Hygrade-Sylvania for its fluorescent lamps and lighting fixtures, according to E. P. Demarest, manager of Sylvania Pacific Co., Los Angeles. Curtiss continues as manufacturers' agent also for S & M lighting equipment, Conduit Pipe Products Co., Tork Clocks, Superior Insulated Staples, and Trade Wind fans and blowers.

● F. J. Airey Co., manufacturers' representative for Southern California and Arizona, has announced the addition to its sales force of R. R. Thompson, formerly with Electric Agencies of California. Accounts recently added, according to the agency, include: Amco Mfg. Co., Glendale, Calif.; A. E. Rittenhouse Co. Inc., Honeeye, N. Y.; Lowell Insulated Wire Co., Lowell, Mass.; Peerco Inc., Park Ridge, Ill.

● Eagle Signal Corp., of Moline, Ill., announces the appointment of Harold M. Hudson Co., 807 Lowman Building, Seattle, as district sales engineer for the company's program timers, reset timers, reset counters, electronic timers and relays. The Hudson Co. also represents I-T-E Circuit Breaker Co., the F. W. Wakefield Brass Co., A. L. Smith Iron Co., Hub Electric Co., and the Standard Electric Time Co.

● E. Fimple, formerly with Southern California Edison Co., at Ventura, is now with Midway Electric Co., at Taft, Calif.

● Safety Switchboard & Mfg. Co., formerly at 570 Folsom St., San Francisco, has moved to 1445 Stevenson St.

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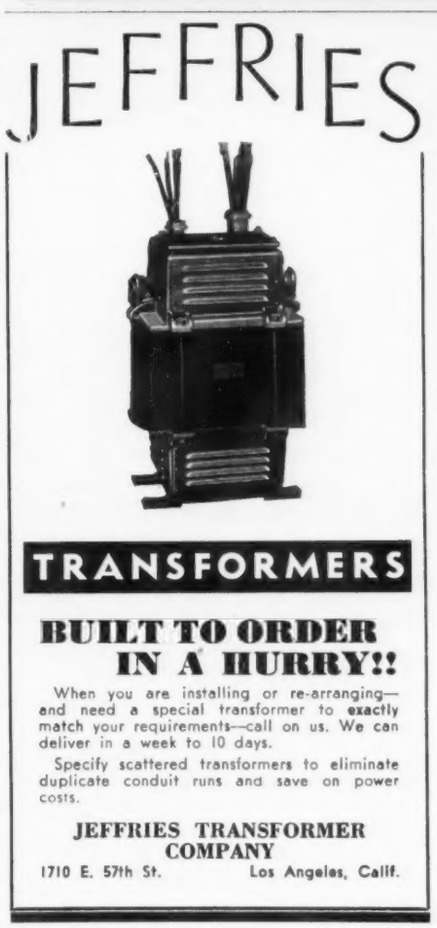
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Permanent
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Reliable ELECTRIC COMPANY
OVER 30 YEARS SERVICE TO THE UTILITIES

PEOPLE
made this news

Edison Company Promotes Kenyon, Hayes

R. G. Kenyon advertising manager of the Southern California Edison Co. for the past 10 years, has been appointed assistant vice-president of the company. Howard W. Hayes, assistant advertising manager, has been appointed advertising manager. Announcement of the changes was made by Harry J. Bauer, president.

Kenyon, a member of the Edison organization for 25 years, was named

Kenyon Hayes

assistant advertising manager in 1926 and became head of the advertising department in 1932. He previously had been employed in the company's accounting and securities departments and was assistant supervisor of employment. He is a director of the Public Utilities Advertising Assn., a past president of Los Angeles Advertising Club and trustee of Occidental College.

Hayes had been assistant advertising manager since 1932 and has been with the Edison Co. 15 years. Before joining the company's advertising staff he was on the editorial staff of newspapers in Pasadena, Santa Monica and Visalia, and was with the Associated Press in Los Angeles and Phoenix.

M. A. deLew Retires; Had Served Industry 54 Years

Maurice Alexandre de Lew retired July 1 as electrical engineer for Tidewater Associated Oil Co., San Francisco, after 23 years of service with it and 54 years in the electrical industry, 49 of which were spent in California. Born 1870, he entered apprenticeship in 1888 at Baxter Electric Motor & Mfg. Co., Baltimore, where he remained until coming West in 1893 to work for Southern Pacific engineer's office at Sacramento, later being transferred to Capitol Gas Co.

In 1904, he took a position as superintendent of construction for National Electric Co., a contracting firm, which he reorganized after the 1906 fire and became its secretary and engineer. In 1914 he went into business for himself as engineer and contractor, and Associated Oil Co. was one of his first clients. He took care of its electrical engineering until 1919, when that company requested him to become its own engineer.

During the 23 years with Associated, de Lew engineered millions of dollar's worth of distribution lines, electrified its oil fields, its Avon and Watson refineries. He pioneered the complete bonding and grounding systems now generally employed by oil companies to minimize hazard from static electric charges and lightning. He also pioneered the complete duplication of distribution systems with Southern California Edison Co. to insure absolutely continuous source of power. His demand for bushings on distribution transformers led to manufacturers' adoption of them as standard equipment. De Lew always took active part in Accident Commission and Railroad Commission committees on codes and regulation.

John C. Hays Dies In New York, July 21

John C. Hays, executive vice-president of Stone & Webster Engineering Co., and a prominent figure in California electric utility circles shortly after the turn of the century, died at his home in New York July 21. A native Californian, he was born in Tulare County in 1883. He began his electrical career along with Emory Wishon on the construction of the Mt. Whitney Power Co. After several years with this utility he went to New York as a consulting engineer.

Hays returned to California in 1907 as president of the Mt. Whitney Power Co., one of the predecessor companies of Southern California Edison. He also was president of the Yosemite Power Co., Mt. Shasta Power Co. and La Grange Water & Power Co. In addition he engaged in private consulting engineering practice in San Francisco. In 1919 Hays joined Stone & Webster.

● L. D. PULSIFER has been named Oregon representative for the industrial and central station divisions of Westinghouse Electric & Mfg. Co., according to announcement by Lyle G. Fear, Portland sales manager. Pulsifer joined the Westinghouse company in 1936 at Portland and since then has held positions in Salt Lake City, San Francisco and Seattle.

TO EXECUTIVES:

NOW YOU CAN HELP

Even More...

New Treasury Ruling Permits Purchases UP TO $100,000, in any Calendar Year, of Series F and G WAR BONDS!

The Treasury's decision to increase the limitations on the F and G Bonds resulted from numerous requests by purchasers who asked the opportunity to put more money into the war program.

This is not a new Bond issue and not a new series of War Bonds. Thousands of individuals, corporations, labor unions, and other organizations have this year already purchased $50,000 of Series F and G Bonds, the old limit. Under the new regulations, however, these Bond holders will be permitted to make additional purchases of $50,000 in the remaining months of the year. The new limitation on holdings of $100,000 in any one calendar year in either Series F or G, or in both series combined, is on the cost price, not on the maturity value.

Series F and G Bonds are intended primarily for larger investors and may be registered in the names of fiduciaries, corporations, labor unions and other groups, as well as in the names of individuals.

The Series F Bond is a 12-year appreciation Bond, issued on a discount basis at 74 percent of maturity value. If held to maturity, 12 years from the date of issue, the Bond draws interest equivalent to 2.53 percent a year; computed on the purchase price, compounded semiannually.

The Series G Bond is a 12-year current income Bond issued at par, and draws interest of 2.5 percent a year, paid semiannually by Treasury check.

Don't delay—your "fighting dollars" are needed *now.* Your bank or post office has full details.

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T. E. Roach Takes Executive Post With Northwestern

Appointment of T. E. Roach as vice-president and general manager of Northwestern Electric Co., Portland, was announced July 1 by L. T. Merwin, president. The appointment was effective as of that date.

In order that he might accept the new position, Roach was released from responsibilities he had held for the past 10 months as assistant to the president of Pacific Power & Light Co. For nine years previous to his association with the Pacific company, Roach had been in charge of operations of Washington Gas & Electric Company, with headquarters in Tacoma, Wash.

During most of his service with the Pacific company Roach was in charge of the company's Washington division, with headquarters in Yakima, Wash. Early in May he was transferred to the company's general offices in Portland to assume new responsibilities in connection with the company's wartime operation and D. F. McCurrach, rate engineer, was named assistant general manager and placed in the Yakima divisional post.

G.C.A.

Lamp Replacers
Lamp Base Removers
Cartridge Fuse Tongs
Switch Hooks

Send for Catalogue
We have been making safety tools for 26 years

THE G. C. A. Manufacturing Co.
Pittsfield, Mass.

Captain Robert Hutchinson Succumbs to Long Illness

Captain Robert Hutchinson, superintendent of the accident prevention department of the British Columbia Electric Railway Co., died at his home at Vancouver, B. C., after a long illness.

Captain Hutchinson came to Canada as a young man from Glasgow, Scotland and joined the staff of the Canadian Bank of Commerce. He served with the Little Black Devils of Winnipeg in the last war, and later with the Glasgow Highlanders, being commissioned as captain with the latter unit.

He was well known as a public speaker and conducted classes in speaking for several years among B. C. Electric employees. He was an active member of the Masonic order, and of the Quilchena Golf Club.

● WILLIAM H. SULLIVAN, formerly Pacific Coast District steam specialist for Westinghouse, has been transferred to Washington, D. C., as a member of the company's Marine Section. A graduate of the University of Colorado, Sullivan has been with Westinghouse since 1936, when he was enrolled as a graduate student at East Pittsburgh.

● MAJOR J. H. PENGILLY, vice-president of the Square D Co., Los Angeles, and manager of its western division, reported July 10 for active service in the United States Army. An officer in the Engineer Reserve, Pengilly served in World War I. He is the retiring president of the Los Angeles Electric Club.

● E. O. "BILL" SHREVE, vice-president in charge of apparatus sales of the General Electric Co., visited Pacific Coast offices during late July and early August. Shreve spent 20 years of his G-E career on the Pacific Coast, first as a salesman and later as manager of the San Francisco district office.

● ANITA AGARD of the San Diego Gas & Electric Co., recently won the Ernestine White public speaking trophy in a contest conducted by the Toastmistress International Club. Miss White is president of the San Diego G&E chapter of the club, which is an organization to promote public speaking among women.

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ANGUS-CAMPBELL, INC.

Thompson Moved to West Coast by Westinghouse

Walter H. Thompson has been named district manager for Westinghouse Lamp Division's Pacific Coast district, with headquarters in San Francisco. He succeeds Ray W. Murphy, who goes to Bloomfield, N. J. in an executive post with the general sales staff. Murphy has been with Westinghouse for 33 years, most of them as Pacific Coast manager.

In his new job, Thompson will have

Thompson

charge of all Lamp Division activities in Oregon, Washington, California, Arizona, Utah, Nevada, Idaho, Western Wyoming, Western Montana, Alaska and the Hawaiian Islands.

Joining the Westinghouse organization in 1937 as manager of utility sales for the Merchandising Division, in 1941, he was made manager of utility sales and assistant district manager for the Lamp Division's Central District at Pittsburgh. Before joining Westinghouse, he had served as Eastern Division sales manager for the RCA Radiotron Co. at Camden, N. J.

● RAY G. HANSON has been appointed manager of the Westinghouse Mfg. and Repair Dept. at Denver it was announced recently. Hanson comes to Denver from Milwaukee Wis. where he held a similar post. He joined Westinghouse in 1919 at East Pittsburgh. He has served the company also in Chicago and Minneapolis.

● THOMAS E. UNDERWOOD, state electrical inspector for the Dept. of Labor & Industries, State of Washington, resigned his position to go into war work. His home is in Spokane.

STEPPING UP PRODUCTION?

Solve Your Voltage Problems with Custom-Built

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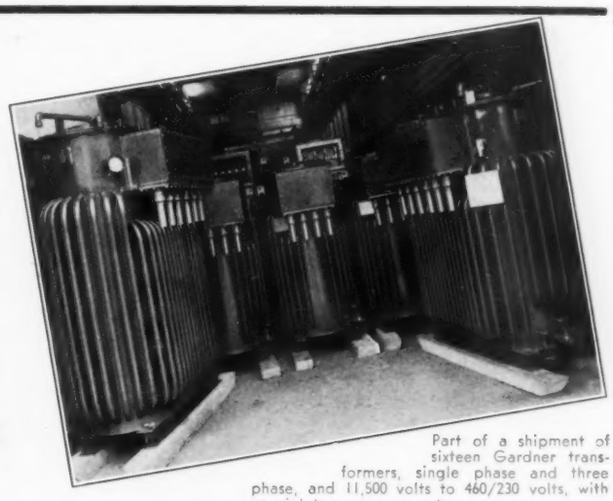

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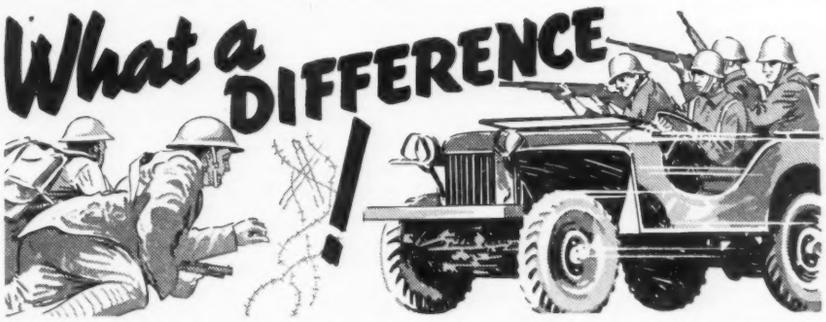
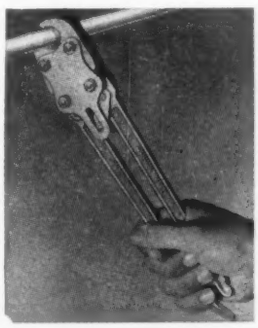
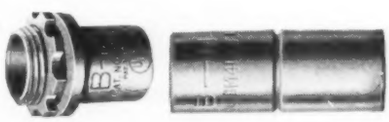


And there's just as much difference between the *streamlined* BRIEGEL METHOD of making conduit connections and former, old-fashioned methods!

Take a look at the picture below: two squeezes with the patented B-M "indenter" (which costs only $1.25) and you have a smooth, efficient job when you use B-M connectors and couplings. No extra turns or twists—no nuts to tighten!

The BRIEGEL METHOD saves you up to 50% on time and a substantial materials-saving (in keeping with today's thinking). Means more profit, too. Approved by Underwriters' Laboratory, of course.





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W. A. Doble Succumbs; Was Pioneer Operator

W. A. Doble, one of the pioneers in the development of the hydroelectric turbine, passed away at his San Francisco home a month ago. He was more than 80 years old. His father, Abner Doble, founded an iron and steel business in San Francisco in 1850 and forged the grips for the first cable cars. Later they became interested in the development of water wheels and many of the older hydro turbines in Western plants bear the name of Doble.

In 1911 the Abner Doble Co. merged with the Pelton Water Wheel Co. and for a time marketed their wheels under the name of Pelton & Doble. W. A. Doble was chief engineer of the merged companies from 1911 to 1921. In 1915 Doble installed California-built hydro turbines in India and in Norway.

Mountain States Elects Officers at Board Meet

Z. E. Merrill was reelected president of the Mountain States Power Co., with headquarters at Albany, Ore., at a meeting of the board of directors June 25. Other officers elected: W. L. Fitzpatrick, vice-president and secretary; A. W. Trimble, vice-president and treasurer; John Ford and J. J. Madden, assistant secretaries; and B. E. Lee and P. A. Lehmkuhl, assistant treasurers.

Only change made in the officers of the company since last year was in the case of B. E. Lee who, on account of illness, resigned as vice-president and treasurer, an office he had held since April 1940. He was replaced by Trimble, formerly assistant treasurer. Lee was retained as assistant treasurer.

● E. E. Tugby, sales engineer of the Pacific Electric Manufacturing Co., San Francisco, has resigned to take the position of electrical engineer in the South Pacific division office of the U. S. Engineers Corps. Prior to joining the Pacific Electric Tugby was for many years in the operating department of the Puget Sound Power & Light Co. at Olympia, Wash.

● William A. Holt, vice-president of Bullock's and president of the California Retailers' Assn., has been appointed a member of the Los Angeles Municipal Water and Power Commission. Holt fills the vacancy created by the death of Clinton E. Miller.

● W. N. Matthews, president W. N. Matthews Corp. and well known on the Pacific Coast, died July 19, of a heart attack. Mr. Matthews was 73 years old.

Answer to "Who Am I?"
(See Page 74)
D. D. Smalley

Electriquiz Answers

1. A.W.G. or circular mils.
2. Compounds.
3. 350,000 volts.
4. (1) Para—because it came from the Amazon valley in South America through the port of Para, Brazil. (2) Plantation—because the trees are grown on plantations or large farms from seedlings of rubber trees from the wild trees of the Amazon.
5. 35,000 volts—11 years.
6. (a) 200 lbs. per sq. in. (b) Oilostatic.

● W. L. Phillips, central division domestic sales supervisor for the Southern California Edison Co., has been appointed assistant manager of the company's Huntington Park district, according to C. E. Houston, vice-president and general manager. Phillips has been an Edison employee for 17 years, beginning as a meter reader in Lancaster. He was chief clerk at Redlands, San Bernardino and Ventura before being appointed to the post of sales supervisor.

● H. S. Schuler, Pacific Coast District sales promotion manager for Westinghouse Electric & Mfg. Co., was named a vice-president of the National Industrial Advertising Assn. at its recent Atlantic City convention.

● C. Dent Slaughter of Anaconda Wire & Cable Co., New York visited Pacific Coast offices of the company last month and saw many oldtime friends.

● Mel Gee, former manager of the Yakima airport, has been named city electrical engineer of Yakima, Wash.

Your job is to deliver the power

Here's How:

The specification "Lapp Insulators" means fewer service interruptions

WITH plants, large and small, drawing on your lines for 24-hour Production for Victory, you cannot risk the crippling effect of service interruptions. That means equipment adequate to supply the demand and secure for operation under all conditions. In insulators for transmission lines and substations it means high-voltage units that don't puncture or crack unexpectedly, that don't give up when lightning hits the line, that don't fracture when kids shie stones at them, that *do* go on through dirt and rain and cold and heat, delivering the power. A great many experienced engineers will tell you that it means Lapp Line Posts and Station Posts, the units with an 11-year service record to prove that they can handle their job best.

Lapp Line Posts and Station Posts are standard equipment for new construction and reinsulation on most systems where they have been given a chance to prove their worth.

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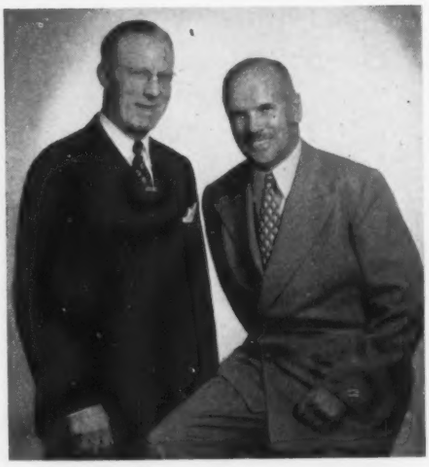
PROFILES *of the month*



Above, meet H. A. Walsh (left) new business manager, and R. K. Banner, merchandise manager, El Paso Electric Co. Right: It was Brown & Pengilly before Square D took over, different Brown but same Pengilly. Now A. D. Brown (standing) of Allis Chalmers, succeeds Joe H. Pengilly, Square D, as president of the Los Angeles Electric Club

Members of the San Diego Gas & Electric Co., organization pictured in front of the permanent case holding the Charles A. Coffin award, which the company won last year for "splendid performance in meeting greatly increased industrial and defense loads." Left to right: M. B. Fowler, vice-president and treasurer; A. E. Holloway, vice-president in charge of sales; L. M. Klauber, vice-president and general manager; Herb Corriere, president employees' association; President Hance H. Cleland; and Hildreth R. Peckam, vice-president in charge of operations. Klauber hands Corriere the award check for $1,000, which will be put in war bonds

San Francisco Electric Club received a special "Radio Salute" at its final midyear meeting, when Station KGO presented the musical airshow, "Over the Top." Pictured are: Alfred Meyer, president Leo J. Meyberg Co.; William B. Ryan, KGO general manager; Charles A. Dostal, Westingtouse Pacific coast district manager; E. J. Duggan, Northern California district manager, Westinghouse Supply Co.

FLASH!
U. S. Plans All-Inclusive Scrap Drive
WASHINGTON, June 30 (U.P.)—A new and intensified Nation-wide salvage campaign to stimulate the flow of all vital scrap materials—rubber, steel, iron, tin and fats—into war factories was announced tonight by War Production Chief Donald M. Nelson.
He disclosed the new progra

WAR PRODUCTION CHIEF Donald M. Nelson ORDERS GIGANTIC, NATION-WIDE CAMPAIGN TO GET IN NEEDED MATERIALS . . .

1 **RUBBER and such vital metals as IRON and STEEL**

2 **FATS for making glycerine used in explosives**

3 **TIN CANS (in certain designated cities)**

EVERY TYPE OF BUSINESS, every home, every farm and factory in the country is expected to take part in this vast mobilization to get in the scrap.

"Scrap", says Donald Nelson, "is a vital part of our raw material supply on which our entire war production depends". One ton of scrap *steel*, for example, is equivalent to five tons of raw material . . . two of iron, two of coal and one of limestone. Obviously we can solve our raw material problem faster . . . and at the same time save shipping, smelting and other production steps . . . if we hurry . . . *now* . . . to get in the scrap!

Consult the Salvage for Victory Committee in your community or write the WPB General Salvage Committee, 1355 Market Street, San Francisco.

DO YOUR PART! *DURATION-IZE YOUR GOOD MACHINERY . . . GET IN THE SCRAP!*

Fifth in a series of advertisements being published by the Pacific Gas and Electric Company aimed at getting in the farm and rural scrap

You can give it *Wings!*

HAVE YOU REALIZED that old jallopy of yours has *another* life to give to its country? . . . down and made into part of a plane, it might even go with General . . . Tokio? Decide *now* that you will do your bit to relieve . . . prices which you

P·G·and·E·
PACIFIC GAS AND ELECTRIC COMPANY

WANTED

MEN AND WOMEN TO LEARN THE APPLIANCE REPAIR BUSINESS...

This is no "want ad" but a reminder of a problem which faces the entire appliance industry. The volume of repair business growing out of the war situation is more than a great many dealers can handle. Some are utterly swamped. Virtually all are having difficulties getting parts, materials, tools, and especially...labor!

At the present writing there is no answer to the problem but there is an undertone of discussion and an evident desire to do something. A recognition, perhaps, that having sold the appliances we, as an industry, have a responsibility to keep them going.

Just what sort of a plan will be evolved we can only guess, but one thing of which we are certain...it must be flexible enough to allow for widely varying conditions in different localities and it must take nothing from the war effort. Probably it should seek to train women, men over sixty and possibly mechanically inclined girls, and boys too young for the draft. In any event, the electric industry should accept the problem as something for common thought and action...*now!*

PACIFIC COAST ELECTRICAL BUREAU

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